COMPUTERWORLD

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DBMS Moves To 4300 With Ease

By Don Leavitt
CW Staff

IBM users got an early Christmas present last week — they found out they can move data base management systems (DBMS) to IBM's 4300 mainframes without doing any major rewrapping jobs.

When IBM announced the 4300 series hardware and the DOS/VSE software earlier this year, there were brooding worries that existing software — built in-house or bought from independent vendors — just wouldn't be compatible with the new environment.

But grinding confrontations just haven't happened. Once they reviewed their products and the IBM offerings, many vendors claimed they'd fit fine with very slight or no adjustments. Applied Data Research, Inc. (ADR) was one of the first vendors to describe in detail what its staff had to do to work in the new setting.

But the worrywarts persisted: those programs were relatively simple and didn't really challenge the reworked

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Users of 30 Series Split on Purchase

By Tom Henkel
CW Staff

Whether IBM's price cuts on 30 series CPUs and main memory is a good deal depends on how much ready cash you've got.

Big users that are leasing multiple top-of-the-line 3033 CPUs seem to be jumping — or at least seriously thinking of jumping — at the IBM offer. Most smaller users, however, plan to give IBM a polite "no thanks" on the deal.

A survey of 20 users renting or leasing 30 series hardware found two definitely buying CPUs, four (all 3033 users) seriously looking at the deal, 13 "no thanks" and one user that won't buy its CPU but will buy some additional main memory.

Soaring interest rates and anticipation of IBM's mysterious H series of mainframes are keeping smaller users wary of IBM's offer of up to 33% off the previous list prices of 30 series CPUs and main memory [CW, Nov. 5].

Leery of being stuck with a dinosaur when the H series makes its appearance, smaller users — those with 3031s, 3032s or a single 3033 — said they'll stick with their leases until they see what the H series actually offers. It is expected to be a more powerful, cheaper and innovative series of mainframes.

Larger users said the deal looks good. They can buy CPUs at the reduced rate, keep them until the H series is available, take a bath on resale and still come out ahead of the rental game.

A New York financial firm that claims to have "more money than God" may do just that. Planning to convert its fleet of one 3031, a 3032 and five Xerox Sigma 9 CPUs to three 3033s, the user is seriously looking at purchase.

Its decision may depend on how long it will take to get delivery on an H se-

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Not Using Funds for Upgrades

House Told FAA Covering Up Outages

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Federal Aviation Administration (FAA) is trying to cover up the frequency and severity of computer outages at the nation's 20 Air Route Traffic Control Centers, several members of Congress charged last week.

That allegation and an additional charge of "culpable negligence" in not using the funds available to the agency for improving air traffic control equipment were leveled at the FAA last Monday at hearings of the House Ways and Means Subcommittee on Oversight.

The hearings on mid-air aviation safety were called after two airliners carrying a total of 208 passengers came within a few hundred feet of colliding in mid-air over North Carolina Oct. 31 [CW, Nov. 12]. The Professional Air Traffic Controllers Organization (Patco) subsequently charged that a computer failure at the Leesburg, Va., Air Route Traffic Control Center, directing the two flights, was a significant factor in the near miss [CW, Nov. 26].

Congressional investigators said that subsequent to that incident they found that not only are computer outages more frequent than acknowledged by the FAA, but also that the agency has actively tried to suppress that data.

That finding prompted subcommittee chairman Rep. Sam Gibbons (D-Fla.) to accuse FAA officials of "censorship in its purest form."

Gibbons' ire was raised after hearing testimony from Rep. Bob Whittaker (R-Kan.), whose office has conducted an independent investigation on air travel safety. Whittaker told the sub-

(Continued on Page 6)

Datapoint Meshes DP, WP, EMS for ARC

By Tim Scannell
CW Staff

NEW YORK — Stressing greater management control and flexibility, Datapoint Corp. last week introduced a number of software products that give integrated word processing (WP), indexing and electronic messaging capabilities to users of its Attached Resource Computer (ARC) systems.

In addition, the company unveiled Lightlink, a short-distance infrared light transmission system that can be used without federal or local registration to send messages between adjacent buildings. It will be available late next year.

Billed as the debut of Datapoint's Integrated Electronic Office (IEO), the software allows users to access and edit information from a common data base, transmit that data to a remote site or construct a multiindexed electronic mail system, according to Harold E. O'Kelley, president.

The lifeblood of Datapoint's IEO is an electronic message system (EMS) package that works through a dedicated processor, such as the firm's 6600, to communicate with remote stations. Composed of the processor, a disk unit and a printer, the system can be interfaced to the ARC network or the company's Infoswitch/Long Distance Control System (LDCS) or used

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CW Communications Changes Its Address

FRAMINGHAM, Mass. — CW Communications, Inc. publisher of *Computerworld*, along with the entire CW headquarters staff is in a new home here today after a tumultuous move that took all weekend. The move was a year in the making.

Our new global headquarters, which is only about 10 minutes further from Logan Airport than our storefront digs in Newtonville, will give us much more space and a delightful work environment.

The new address is 375 Cochituate (Ko-chit-choo-it) Road, Rt. 30, Framingham, Mass. 01701.

The new phone number is (617) 879-0700, and the new Telex number is 95-1153 COMPUTWRLD FMH.

Along with our entire headquarters staff, which now numbers about 100, we've moved our computer-based typesetting equipment as well as our circulation system. Hope it all works — please bear with us.

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The Old . . .

CW Photos by A. Dooley

And the New

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AS/7031 Price Cut Almost in Half

By Marcia Blumenthal
CW Staff

SAN FRANCISCO — Following IBM down the Series 30 price-cutting path, National Semiconductor Corp.'s National Advanced Systems unit dropped prices by nearly 50% for its AS/7031 processor last week.

At the same time, the firm announced a short-term leasing plan for the system and reduced prices for IBM 370/158, 370/168 and Series 30 memory from $50,000 to $40,000 per 1M byte. IBM is now selling 1M byte of that memory for $50,000.

Although the AS/6, 7 and 8 mainframes are also compatible with the IBM Series 30 line, no price reductions have yet been made for these models.

National Semi is "heatedly negotiating" with Hitachi Ltd., maker of most Advanced Systems CPUs, and should soon have news on price cuts and more product information on the AS/6-1 and AS/6-2, a spokesman said.

Except for the AS/7031, Hitachi manufactures the rest of the IBM plug-compatible processor line that National Semi acquired from Itel Corp. on Oct. 1. However, Hitachi is not currently producing the high-end AS/8-7034.

At the reduced price, the AS/7031 with 2M bytes of memory sells for $600,000, 25% less than IBM's current $800,000 price for a comparably configured 3031.

National Semi said it could provide immediate delivery for the AS/7031.

In addition, National Semi is offering users for the first time 18-, 24- and 36-month lease options, as Itel previously did. Although National Semi did not provide specific lease rates, the spokesman said prices would be 20% less than IBM's published lease price for Series 30 equipment.

Maintenance will be tagged at about $4,000/mo, he added.

Figures Don't Jibe

In announcing its price reductions, National Semi cited relative performance and machine cycle time ratings that do not coincide with *Computerworld* ratings published on July 16.

The relative performance rating for the AS/7031, according to National Semi, is now 62 vs. the 54 reported by CW; 54 is the same performance rating assigned to IBM's 3031. Moreover, National Semi showed a decrease in the machine cycle time from 100 nsec to 92 nsec.

A National Semi employee said its figures were based on CW's ratings, but at press time could offer no explanations for the differences between the currently reported and previously reported system characteristics.

Vandals Hit GSA Center

CW Washington Bureau

WASHINGTON, D.C. — A government computer center that recently beefed up its access controls following a critical report of its security operations was briefly put out of action last month by an act of vandalism, apparently by someone employed at the facility.

Between $15,000 and $20,000 worth of damage was done to the two IBM 360/50 mainframes at the General Services Administration (GSA) regional office building here Nov. 17, according to Robert V. Crisp, director of the Regional Data Systems Division.

Wires were pulled from the console of one of the CPUs and from one of its memory units. The second mainframe was damaged when several switches were left fully open, causing overheating of its internal storage.

The Federal Bureau of Investigation and the GSA Field Investigations Office have been called in to investigate the incident, Crisp said. At this time there are no suspects.

The computer facility, known as the IBM center, was the subject of a GSA internal audit this summer that turned up a number of security problems, primarily related to what the auditors said was a lack of proper access controls [CW, Oct. 29].

CW Moves Headquarters

(Continued from Page 1)

Typesetting uses two Quadex Corp. 200 series input and editing systems based on Digital Equipment Corp. LSI-11 microcomputers. Each is equipped with two terminals.

Type is set by two Itek phototypesetters, originally known as Pacesetter Mark 1s, from Dymo Graphic Systems. Glossy galleys ready for paste-up are produced by a photoprocessor from Recognition Systems, Inc.

CW's circulation department uses an Inforex, Inc. 5000 system with 11 terminals and one 320M-byte disk to update our subscriber list. The list is maintained by Crain Communications, Inc., CW's fulfillment house in Chicago. Communications between the two is via an Inforex 1303.

In addition to hundreds of file cabinets, typewriters, desks and chairs, our movers trucked out a hodgepodge of facsimile and Telex equipment.

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"I'm aware of many who have tried ADR's ROSCOE® on a 30-day trial."

"I know of no one who gave it back after 30 days."

—Jerry T. Sanders, Center for Disease Control.

ROSCOE, TSO, VSPC, and CICS coexist peacefully.
The Center for Disease Control uses CICS for data management, VSPC for interactive problem solving by management and scientific personnel, TSO for interactive system monitoring, and ROSCOE for program development, batch access, and retrieval.

60 ROSCOE users on an IBM 158.
"When I first came here," says Jerry Sanders, Senior Systems Programmer, "I was known as a TSO bigot. If TSO couldn't do it, it wasn't worth doing. Besides, TSO came free on an MVS system, so you'd be crazy not to use it. But the Center had VS1 which didn't support TSO, so I had to look for something else and it turned out to be ROSCOE. I still like TSO. It's powerful, it's free, but the overhead is prohibitive. We average over 42 concurrent ROSCOE users and hit peaks approaching 60. How many shops have you seen supporting 42-60 concurrent TSO users, 8 batch initiators, and 4 other TP systems on a model 158-AP with good response time?"

"We've measured TSO."
"The results were 52-55% less CPU usage on ROSCOE than on TSO with equivalent functions under MVS. Everyone we talk to supports these figures. They come up with something between 50-60% less CPU usage with ROSCOE."

ROSCOE compresses data.
"Our data occupies three 3330-1 disk volumes," Mr. Sanders continued. "That amount of data would normally occupy almost six 3330 volumes. Those extra three volumes could cost $33,600 a year under a lease agreement. This alone can be very sobering."

Logical approach to output retrieval.
"ROSCOE protects users from many of the pitfalls that they can run into trying to retrieve output with TSO or VSPC. For example, suppose you have output on the queue, you're on TSO, and you wish to retrieve the output. You issue the command. The output starts. And you must have made up your mind, in advance, what the disposition of this output is once it's viewed. You must decide whether you want to delete it, print it, or hold it—before you ever see the output! ROSCOE gives you the option at any point in the process to purge an individual output file, purge the whole job, print the file, hold the file, or reroute the file. It seems to be a more logical approach to retrieving output."

"I installed ROSCOE myself."
"We received ROSCOE on a 30-day trial, in the form of a reel of tape and a set of documentation. I was supposed to wait until the ADR representative got here. When ROSCOE arrived I was excited about implementing it, so I broke the envelope open and found an installation manual. I went through it and had ROSCOE up in a day."

ROSCOE fast and easy.
Judy Pesses, Systems Programmer, commented: "VSPC is easier to use than TSO but harder than ROSCOE and it doesn't have the command processors and monitors that TSO and ROSCOE do. If you add the optional capabilities to TSO, it'll do many of the same things ROSCOE does but it's much slower. Even the full-blown TSO system doesn't have ROSCOE's text editing power and flexibility. TSO is harder to use, response time is worse, it's not as flexible—it just slows me down."

The Center for Disease Control in Atlanta, Georgia is responsible for safeguarding the health of the American people by investigating, controlling, and preventing disease. The Center is concerned not only with infectious disease but with occupational safety and health, family planning program evaluation, birth defects surveillance, leukemia epidemiology, lead poisoning, urban rat control, and the health education of the general public. The DP department at the Center has grown from a small IBM 370/145 with ¾ meg and one time-sharing system, to a 370/158 with an attached processor, 6 megs of real memory and 56 spindles. There are 25 applications programmers and systems analysts, and some 3,000 programs.

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CW to Launch Book Service

FRAMINGHAM, Mass. — *Computerworld* readers will be able to order from a selection of current DP-related books when Computerworld Books is launched next month.

The titles will be reviewed by the CW editorial staff and will include both technical publications and general management books. Selections will be made on the basis of usefulness to CW readers. An easy ordering system will be provided for all books advertised.

In addition to offering books from other publishers, CW plans to publish books of its own. Suggestions on the kinds of books that CW should publish, as well as information on existing manuscripts, are welcomed.

Authors with promising works in progress are encouraged to notify CW. Suggestions and inquiries should be addressed to Editorial Department, Computerworld Books, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

Officials at Census Knew Before August Flooding That Sprinklers Could Leak

By Jake Kirchner
CW Washington Bureau

SUITLAND, Md. — When the sprinkler system at the Census Bureau's DP facility here leaked last August, causing millions of dollars in damage, it was a nightmare come true for Census officials.

Internal Census documents obtained by *Computerworld* show that bureau officials were aware as early as last winter that the system might leak. That fear prompted the bureau to conduct a less than full test of the system April 22.

In a Sept. 12, 1979 memo sent to Bruce Ramsey, Census Bureau associate director of computer services, the chief of the bureau's DP administrative branch, Richard B. Tully, explained that the dry pipe system was not fully tested because he had been warned that the heads might leak when the system filled with water.

That is exactly what happened when the pipes filled with water Aug. 8, after a fire alarm was accidentally pulled.

Setting the background for the incomplete test of the system, the memo reports that in a Dec. 28, 1978 activity report, the Engineering Division expressed concern that work done by the General Services Administration (GSA) to install the new sprinkler heads was not tested upon completion — at least not to the knowledge of the Census Bureau.

On Jan. 24, Tully said, "EDP area personnel reiterated this concern. Subsequently, an inspection of the smoke detection/fire suppression alarm systems throughout the EDP areas was scheduled with the intent being to assure that all systems were operational.

Limited Test

"As for the sprinkler system, we intended to test the system just short of actually releasing water through the sprinkler heads. Then at an April 19, 1979 inspection team briefing, GSA again advised that the system could be tested without releasing water to the actual head locations.

"The reason stated for their reluctance for 'going the whole way' was that their experience with this type of system is such that we may experience some 'leaks.' " Because this possibility had been mentioned previously, the bureau had procured a supply of plastic sheeting for use if leaks did develop.

"After more discussion," Tully continued, "we yielded to GSA's recommendations, feeling assured that the limited test [releasing water to the standpipe, which controls the flow of water into the actual sprinkler pipes, but not to the head locations] would ensure the system's operability and not pose a 'needless' risk of water leaks.

"I agreed that it was prudent not to pose any needless risk during the inspection," Tully said.

He added that his "impression of leaks was something on the magnitude of a dripping faucet." In actuality, when the heads accidentally opened Aug. 8, some 500 gallons rained down on the center's four Univac mainframes and numerous peripherals.

The memo concluded with Tully remarking that "though of absolutely no consolation, I should note that had the April test proceeded as originally planned, we would have doubtlessly experienced the water damage four months earlier than we did. However, to speculate on the degree of damage had we tested in April would be just that — sheer speculation."

DBMS Vendors Report VSE No Problem

(Continued from Page 1)

coding of VSE or the totally new fixed block architecture (FBA) of IBM's new disk subsystems. Just wait until the people marketing DBMS and other massive software systems tried to make them fit the 4300 hardware and software, they warned.

Well, the waiting is apparently over. Several DBMS vendors have announced successful use of their products on 4300/VSE equipment, and calls to other vendors found they had already done the minor work needed to make the fit or were just about to . . . and the changes were so trivial they weren't even sure they could be considered newsworthy.

Meanwhile, incidentally, a spokesman for IBM said the DOS-oriented DL/1 subset of the company's IMS DBMS is now available for customer delivery and is operational in the VSE environment.

IDMS 'Fully Operational'

The first of the DBMS vendors to claim 4300-based use of its product, Cullinane Corp., early last week said Release 5.5 of its Integrated Data Base Management System (IDMS) "is fully operational under DOS/VSE for IBM's 4300 processor."

There was no change at all required to make IDMS' "local" version — for a single user — run under VSE on a 4331 CPU, according to Cullinane's director of product coordination, Skip Hart. The "central" version — with multiple users sharing one copy of DBMS — had to have two lines of code changed.

Both of IBM's FBA-based disk units — the 3310 and the 3370 — are supported under IDMS Release 5.5. Since Cullinane has yet to gain access to a 4341 CPU, Hart couldn't be sure IDMS would run under VSE on that machine, but he noted the DBMS does run under OS/VS1, and that operating system is on the 4341, according to IBM.

System 2000 Up

At mid-week, Intel Corp. reported successful installation of its DBMS, System 2000, on the IBM 4341. With only six of the CPUs in existence, the installation was made on a laboratory model at IBM's data center in Munich, Germany, according to Robert S. Rosenthal of Intel.

System 200 was developed by MRI Systems Corp., which was acquired by Intel last year.

Both System 2000 and an application program provided by Copenhagen-based Fondscentralens Sekretariat were up and running within 48 hours and were in full production the following day, Rosenthal said.

In addition to proving that System 2000 can be used on the 4341, he said, the test showed the CPU itself is about 20% more powerful than published figures indicated.

Contacted by phone, a spokesman for Cincom Systems, Inc. said his firm has moved both its Total DBMS and the companion teleprocessing monitor, Environ/1, to VSE and both the 4331 and the 4341 in Europe in about May. Total "certainly" drives the 3310 and 3370 FBA disk units, and the software is already installed at a customer site in Switzerland, he said.

In discussing DBMS and the IBM 4300 hardware and software, the Cincom source made no mention of Total Information System (TIS), the product the company announced just about a year ago as a replacement for Total. TIS was originally expected to be ready for general release last April, but little has been heard of it since its announcement.

Also contacted by phone, Edward J. Forman, newly named vice-president of technical operations at Software AG, said his company's Adabas DBMS runs under VSE on a 4341. He expects it will do as well on a 4341, but can't be sure until he can get access to one.

It took less than a week for one of Software AG's technicians to recode a bit of the system to get Release 3.2.1 — "that's our regular release; there's no need for a special one" — running in the new setting and supporting 3310/3370s, Forman said.

Down in Dallas, Kenneth Parker, who heads ADR's Datacom operations, said the DBMS now scheduled for customer delivery right after the first of the year will run on 4300/VSE setups.

Rumors Cause Stocks to Climb

NEW YORK — Rumors of a settlement in the U.S. vs. IBM antitrust case sent stock prices climbing one day here last week, but both IBM and the Justice Department dispelled those rumors.

Despite IBM's quick denial of a settlement, its stock rose 1-1/4 points to 65-3/4.

The rumors may have been caused by speculation about a Wednesday afternoon press conference the government called and then canceled. The press conference was to be held on the results of an inquiry into the conduct of White House Chief of Staff Hamilton Jordan.

So far, settlement talks between IBM and the Justice Department have been "purely exploratory," according to Mark Sheehan, a Justice Department spokesman. "They never got into substance. The discussions were on how to hold talks."

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Improvements to Sprinkler System 'Marginal'

Census DP Center Still Threatened by Flooding

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Census Bureau's Data Processing Division has only slightly improved its fire sprinkler system and is threatened with a repeat of the disastrous flooding of its computer room that brought its operations to a standstill in August, according to Congressional investigators.

Immediately following the Aug. 8 flood [CW, Aug. 13], the General Services Administration (GSA) replaced the sprinkler heads blamed for the accident and tested the new system, according to Census officials, who say they are now satisfied with that part of their physical security program.

But General Accounting Office (GAO) investigators recently told the House of Representatives Census and Population Subcommittee that serious deficiencies in security still exist at the bureau's Suitland, Md., DP facility.

The bottom line, according to subcommittee staff director Michael Ferrell, is that "the bureau has only marginally improved the sprinkler system and therefore only slightly decreased the possibility of another accident."

The accident destroyed two Univac 1108 mainframes and damaged two additional Univac CPUs. A replacement Univac 1100/83 is currently being installed with acceptance testing to begin this week.

The bureau off-loaded a certain amount of its workload to a Univac site here and will continue to do so at least into the first quarter of 1980, according to Howard Hamilton, assistant director for Computer Services.

Ferrell said GAO estimated the final bill for the accident, including the outside computer services and $2.16 million for the first year 1100/83 lease, will come to about $3.5 million.

Primary Concern

Ferrell said the primary concern of the subcommittee — that the 1980 decennial census might be delayed by the accident — has been removed by the bureau's ability to off-load some of its less important work and to quickly replace the damaged equipment.

But, he added wryly, the flood "didn't upset any of the schedules for the decennial [census] primarily because they were so far behind to begin with."

The GAO and the Inspector General's Office of the Commerce Department, the parent agency of the Census Bureau, still have not been able to fix the blame for the accident, according to Ferrell and Census officials. But both investigating teams reportedly still feel a maintenance worker may have accidently pulled the fire alarm that caused the sprinkler system to activate.

The immediate concern, Ferrell said, is not to fix blame but to upgrade the security systems at the bureau to prevent a reoccurrence of the incident. Ferrell said the GAO found "little if any security or safety plans in force" and said his subcommittee will "continue to follow it up and continue to monitor" the situation to make sure the needed corrections are made.

The Bureau's Hamilton acknowledged that a number of additional security measures are in the works for the DP operation and noted that the bureau has been concerned about the general situation for the last year and a half. Also, the bureau had been aware of the possibility of leaks in its sprinkler system since early this year (see story on Page 4).

Hamilton reported that the bureau is expanding its sprinkler system to cover a wider area of the computer operation, containing some $40 million in equipment. It is also taking additional steps — such as deploying hand-held fire extinguishers, beefing up smoke and fire detectors and alarms and installing a monitoring system for the sprinkler system — to detect any degradation of its operability.

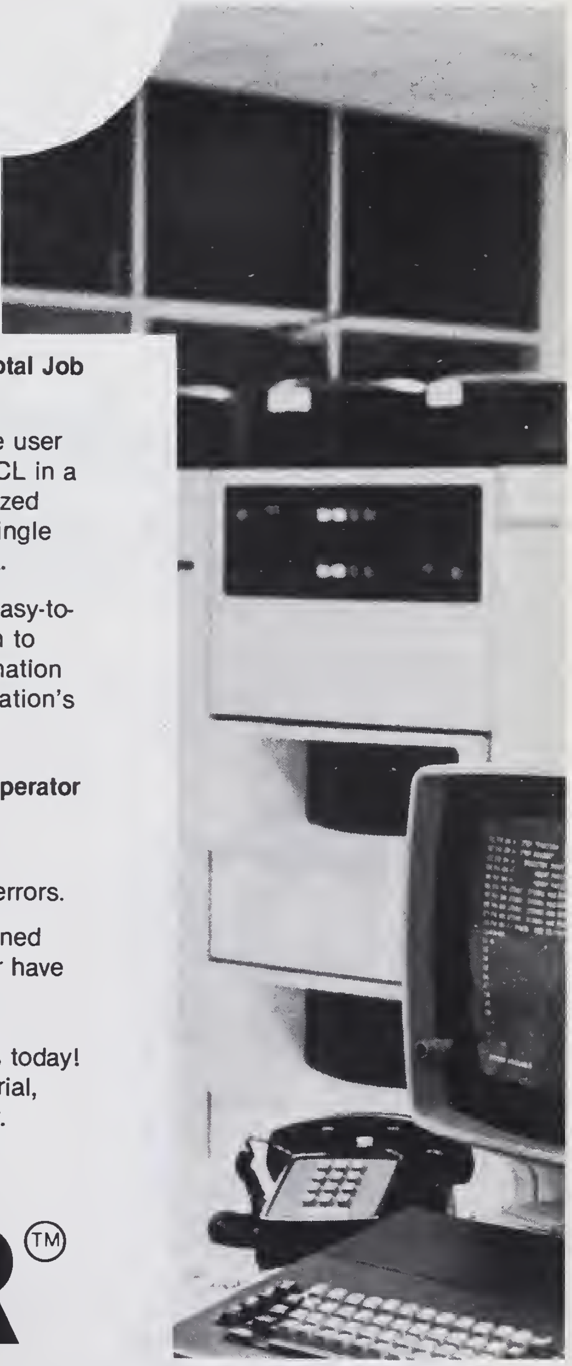
The bureau is also investigating the possibility of installing a Halon 1301 fire supression system to minimize the danger of water damage during a fire. But given present GSA regulations, which require water systems, and the physical layout of the DP center — deemed unsuitable for a gas system — a Halon system is not likely to be approved, Hamilton said.

GSA Responsibility

Hamilton said his office has been negotiating with the GSA for the last year and a half for improvements to DP security arrangements. The GSA, as owner of the building, is responsible for all physical changes to the structure.

In addition, both the Census Bureau and House Subcommittee hold GSA primarily responsible for the installation of the wrong sprinkler heads, which leaked because they were mismatched to the plumbing system [CW, Oct. 8].

Hamilton said he is also concerned about the location of the computer room in the GSA structure. The main DP room is built overtop a loading dock where chemicals are stored, trash is compacted and large trash trucks make frequent pickups.



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Despite FAA Reassurances

Air Traffic Specialists Alarmed Over Outages

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — While a computer failure at an air traffic control center is an alarming, sometimes terrifying experience for the air traffic controller whose screen freezes, flickers or even, on occasion, goes completely blank, the situation is equally distressing for those responsible for maintaining the complex array of computer, telecommunications and radar equipment at the 20 U.S. locations.

"Over the past few years, we have become increasingly anxious, angry and frustrated concerning computer and other systems outages," Howard E. Johannssen, president of the Professional Airways Systems Specialists (Pass), told a Congressional subcommittee last week.

"Our anxiety stems from our knowledgeable recognition of the profound dangers to aviation of the present situation, dangers which are systematically concealed by the FAA," Johannssen told the House Ways and Means Subcommittee on Oversight last Monday.

Pass members are responsible for the maintenance, correction and certification of over 140 types of equipment that make up the national air space system.

"We are angry," the Pass president said, "because the future portends even more outages and even less safety due to the FAA's policy of favoring parsimony over precaution, bureaucracy over flexibility and shortsightedness over responsible planning for future systems.

"While the FAA complacently points to the reportedly high reliability of the system when any criticism is leveled, we who service and maintain the system realize how illusory that reliability is and how deceptive the FAA's claims to the flying public are," he said, charging there is a "concerted" effort by the FAA to distort the true reliability profile of the system."

Complicated System

Even under the best of circumstances, the control center's systems personnel have a formidable job in maintaining what the FAA calls "the most complicated real-time system in the world."

According to an FAA description, "All centers have a cental computer complex (CCC), which is the master computer containing the national air space operational program. Fifteen centers have a computer display channel (CDC) and five have a display channel complex (DCC), which are the computers that process and display the radar data for the controller.

"The Leesburg, Va., CCC, which employs a reconfigurable IBM 9029D, is comprised of the following major elements: three computer elements, three input/output control elements, six storage elements, three peripheral adapter modules, three flight strip printer control modules, three tape control units with 17 drives, three disk control units with six drives, two high-speed printers and one card reader/-punch.

"The DCC in use at Leesburg has three computer elements, two input/-output control elements, four storage elements, two tape control units with eight drives, one high-speed printer, one card reader/punch, five radar keyboard multiplexers, four nonradar keyboard multiplexers, 12 display generators and two data adapter units."

Outages Inevitable

Given the complexity of this type of system, Johannssen said, "outages do occur and they will occur with more frequency and for a greater duration in the future."

One of the major reasons for outages is that maintenance schedules have been seriously "stretched," Johannssen reported. "Required procedures once necessary three times a day [have been] relaxed to once a day; those previously required daily are now required an average of twice a week; those [previously] required weekly are now monthly, and so on."

He blamed the lax maintenance procedures on "misdirected economizing" by the FAA. "Armed with its fallacious reliability statistics, the FAA has allowed staffing to stagnate while the system and technology has mushroomed." This stagnation is blatantly obvious in a serious erosion of training programs for systems specialists, he said.

"The most important result of short staffing is much simpler," Johannssen continued. "There is simply no one there to mind the store."

At the Leesburg center in both April and May of this year, for example, "a single specialist was alone responsible for the repair and maintenance of two triplex computer systems, each located on a different floor, for an entire shift." Similar situations are becoming more frequent, he added.

Further Cutbacks

To make matters worse, the FAA is cutting back even further on maintenance personnel, Johannssen said, moving to reliance on a remote maintenance monitoring system (RMMS).

"In terms of future plans for the system, dependence on the [RMMS] can only mean increased outages of greater duration . . . Due to reliance on the RMMS, the necessary reaction time for a specialist to go to the site and correct the problem will be lengthened," he charged.

House Told FAA Sitting on Information

(Continued from Page 1)

committee he has had significant difficulty in obtaining accurate FAA information on the frequency of computer outages at the 20 control centers.

"It appears, in an effort to proclaim the reliability of its equipment, the FAA attempts to minimize the effects of computer breakdown, and its records do not truly reflect the time that a computer is not of any use to a controller," he said.

"I had hoped to compare . . . FAA reports with similar reports filed by air traffic controllers to their employee organization [Patco]. Unfortunately, the FAA has sought to withhold this information."

Whittaker said "it is my understanding that on Friday, Nov. 14, many of the control centers around the nation received a message from Washington not to volunteer or provide any information concerning computer outages. When individuals requested to see these records, they were denied permission because of the Washington directive."

This allegation, coupled with similar charges of others testifying before the subcommittee that they had to resort to Freedom of Information Act requests to obtain the FAA information, led to a heated exchange between Gibbons and FAA officials.

Agency representatives told the subcommittee they had issued no directive against making public the information, but had requested that all such requests be directed to the Washington office "in the interest of consistency and accuracy of information."

Gibbons countered that it "sounds like censorship to me, and I don't think that you have any authority to exercise any censorship."

When the FAA officials tried to reiterate that they were only trying to provide "accurate information and systemwide information," they were shouted down by Gibbons, who accused the agency of trying to "sanitize" the information. "I am telling you it is censorship," he thundered at the agency witnesses, "and I'm telling you not to do it. Do you understand that?"

As to the actual number of computer failures, both Whittaker and the FAA agreed that the 20 control centers experience at least one computer outage per day. They disagreed, however, on the severity of those breakdowns.

FAA Deputy Administrator Quentin S.C. Taylor told the subcommittee the failures are mostly less than one minute in duration and do not adversely affect controller efficiency.

However, Whittaker said that on Nov. 20, "the FAA suddenly reversed its earlier claims and admitted that 88% of the computer outages this year were over one minute in length" and "pose a very serious problem."

The frequency of the outages is blamed on the antiquated IBM series 9020 computers in use at the control centers. The computers are scheduled for replacement in the mid-1980s, but several witnesses claimed the acquisition process is so protracted that the new equipment will be obsolete by the time of installation.

How Frequent Are DP Failures?

WASHINGTON, D.C. — Just how frequent are DP outages at the nation's 20 air traffic control centers?

Last week's hearings before a House subcommittee produced no firm agreement, and the Federal Aviation Administration (FAA), an agency established after a series of three mid-air collisions in the late 1950s, steadfastly maintained the computer failures are mainly of short duration and pose no serious threat to air travelers.

Some of the figures presented at the hearing, however, would appear to contradict the FAA assurances. Rep. Bob Whittaker (R-Kan.) provided the House with the following partial list of computer outages at nine control centers during 1979:

- Albuquerque, N.M.: Sept. 1, one hour and 15 minutes; Sept. 19, one hour and 33 minutes; Nov. 6, two hours.
- Atlanta: Aug. 7, 24 outages in a six-hour period; the week of Aug. 28, 46 failures greater than one minute.
- Cleveland: May to October, 143 outages over one minute.
- Denver: Oct. 13, a ten-minute outage that resulted in one near miss and one major system error which almost became a near miss.
- Houston: June 13, outage of 14.5 hours; the month of October, 19 outages over one minute.
- Indianapolis: August, 24 failures over one minute; September, 27 failures over one minute; October, 68 failures over one minute.
- Miami: September, 30 outages over one minute; October, 49 outages over one minute.
- New York: Nov. 21-23, computers entirely inoperable for more than 48 hours.
- Washington, D.C.: April 3 to Oct. 22, 143 outages.

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IBM User Warns of Move From Lease to Sale

By Tom Henkel
CW Staff

MIAMISBURG, Ohio — If IBM's price cuts on 30 series mainframes look like a rosy deal, the bouquet may start to wilt once you sign a purchase agreement.

Bob McKenna, manager of DP operations at Monsanto Research Corp. here, said he turned into "a second-class citizen" the day he switched from renting two 360/50s to buying a 360/65.

"When you lease, you're in a better bargaining position" with IBM, McKenna said. As soon as he decided to buy his mainframe, "service went downhill."

McKenna's shop has a bouillabaisse of hardware. When IBM customer engineers showed up — often three hours after a problem developed — they started in on a finger-pointing match, blaming everything except the IBM products (the CPU and assorted peripherals) as the source of the problem, McKenna said.

In addition, Monsanto decided to run its DP center on Saturdays. If problems cropped up on the weekend, it was difficult to reach an IBM customer engineer until Monday morning, he recalled.

Two years ago, McKenna decided to take what at the time he felt was an unpleasant option — switching to a third-party maintenance firm. Now he's glad he did.

Despite his faith in IBM service, McKenna said it just wasn't worth it.

After he switched to the third-party maintenance vendor — in this case Sorbus, Inc. — maintenance costs dropped $35,000 a year. In addition, Sorbus is willing to provide two on-site customer engineers — a benefit IBM would not offer, McKenna said.

Users of 30 Series Polled

(Continued from Page 1)

ries CPU once that line is announced. It may buy the 3033s as an interim measure.

Like the New York firm, a major West Coast bank and a Midwestern bank, both leasing multiple 3033s, said IBM's price cuts certainly got their attention. Although neither has made definite plans, both seem to be leaning toward the IBM offer.

Hennepin County, Minn., although it does not compare with the multiple CPU installations of the major financial institutions, likes the IBM offer and feels lucky to be able to take advantage of it.

DP manager Keith Nelson said the county will buy its single-processor 3033 — a change from its previous plan to lease. "We had the thing timed out well enough to get the price decrease. We [decided to buy] the end of October, but we didn't turn it over until Nov. 1, anticipating the decrease," Nelson said.

"We gave [the CPU] a three-year useful life. [Then] we'll be selling the 3033. If our timing is right, there will still be a market [for the 3033], but it may not be as good. We'll find a buyer — I hope."

Hennepin County plans to buy an H series CPU when it sells the 3033, he added.

No Deal

An East Coast insurance firm using four 3033s, with two more on order, will not buy its CPUs. A spokesman said the firm is waiting for the H series, and it is not company policy to buy CPUs for such a short term.

Likewise, a California-based service bureau running a 3033 said it is not interested in IBM's offer because "we don't want to get stuck with any old junk." The firm will continue to lease its hardware, according to a spokesman.

Fear of being stuck with a dinosaur was the most common sentiment among smaller users. All but one of those polled said they plan to shy away from the IBM offer.

Denny's, Inc. Computer Services, the lone buyer among the smaller shops surveyed, said it can buy its 3031 and cost-justify it within 14 months. "We've done it before," technical support manager Gregg Nelson said. "We bought a 370/148 on the same deal and cost-justified it in 14 months."

Nelson is not worried about getting rid of the CPU. "At the end, we'll lease it out or just keep it for a backup. The H series is liable to be a bit overpowered, so there will be a need for an intermediate machine," Nelson said.

The University of Maine plans to take a wait-and-see attitude on the price cuts. A spokesman said the school won't buy its leased 3031, but it is seriously looking at adding 1M or 2M bytes of main memory to its existing 3M bytes.

The school thinks it can get a better deal on the CPU if it waits a few more months. Further price cuts should be announced as release of the H series draws near, he explained.

Although the *Computerworld* survey did not turn up many users who definitely plan to buy formerly leased hardware, a similar survey of only large 3033 users by a long-time IBM watcher, the Gartner Group, a research division of Dillon Read & Co. in New York, showed a large majority of the users it polled will take advantage of IBM's price cuts.

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Datapoint Pulls Out Stops At New York Product Debut

By Tim Scannell
CW Staff

NEW YORK — Borrow a few lessons from Barnum & Bailey, throw in a little Hollywood tinsel and sprinkle lightly with some tricks gleaned from the network news shows. You'll probably come up with the same production Datapoint Corp. did when it held a product introduction here last week.

Staged in one of the larger rooms of New York's Essex House, complete with crystal chandeliers and plush red and gold carpeting, the performance involved no less than four complete computer systems, several perfectly cued speakers and a 10-screen, full-color multimedia slide show.

As members of the press sat in thickly padded chairs sipping host-sponsored refreshments, the sound-accompanied slides covered nearly 100 years of DP- and non-DP-related events. Cary Grant shared screen space with the Beatles, while Elvis Presley flashed alongside Benny Goodman. Even Rosie the Riveter was featured in a sequence that spotlighted World War II.

Throughout the nostalgic show were the sounds of typing and the sight of fingers flying over a keyboard — which, by the way, was the computer angle. The point of the show was to portray the way offices were run then in contrast to Datapoint's Integrated Electronic Office (IEO) products and the office today.

According to a Datapoint spokesman, the production took six months to plan and underwent a number of last-minute changes to capture and hold the audience's interest. An army of people, specializing in everything from the technical aspects of the show to making sure that everybody had a hot cup of coffee, worked behind the scenes of the extravaganza.

Speakers were positioned at either end of the stage. Each spoke a few sentences as a spotlight played from one to the other. At one point, a speaker's comment was followed by the boom of a special audiovisual effect, making up for anything lacking in his vocal prowess.

At the finish of this off-Broadway exposition, at least two people clapped, obviously having enjoyed the show. Since the room was dark, however, it was not evident if the cheers came from the audience or from members of the Datapoint staff, who abounded throughout the room.

Oh well, that's show biz.

The IEO merges DP and communications with WP and an EMS.

ARC Users Get Integrated DP, WP, EMS

(Continued from Page 1)

on a stand-alone basis to communicate with foreign terminals such as TWX or Telex, a spokesman said.

Although the EMS cannot run on any non-Datapoint products, it will be able to communicate with other machines using a number of industry-standard protocols, including RS-232C and IBM's 3270.

Encrypted Messages

When used in an intracompany mail mode, the EMS can send messages throughout the ARC configuration or to one specific station or person. Messages are sent according to one of four priorities — immediate, urgent, regular or overnight — and can be encrypted with a user code that scrambles the message until it is decrypted at the receiving station, the spokesman continued.

Messages not immediately received are stored in the user's Outbox, which is polled regularly for any activity by the dedicated processor or Electronic Network Controller. Local messages are either sent through the ARC communications network or over flat-rate facilities managed by the LDCS.

Upon receipt of the message, the system can be used to send an acknowledgement message to the originating station that specifies the exact time the electronic note was delivered.

The EMS also provides the using company with detailed or summarized reports of all message activity, providing a means for billing messages back to users depending on length, number of copies and options.

Heart of IEO

The heart of the IEO is the WP software, which not only incorporates the standard text editing features but has an Associative Index Method (AIM) system that allows users to extract information from a data base without using titles or having an extended knowledge of the subject matter, the spokesman stated.

In fact, he noted, documents or data can be pulled from the ARC-controlled files by using just the basic idea of a subject.

Documents accessed via AIM can be distributed to other sites by the EMS, or the EMS can utilize the indexing system to check on the spelling and address of a message recipient before any information is sent.

Infrared Communications

Finally, Datapoint showed Lightlink, a short-distance communications device that uses modulated, noncoherent infrared light instead of heavily regulated laser or microwave systems.

Acting as an extension of the computer's interprocessor bus, Lightlink lets users transmit digitized information between ARC stations up to two miles apart, the spokesman said. It sends and receives data at rates of 2.5M bit/sec and can operate under extreme weather conditions.

The system was designed to automatically shut down if environmental conditions are too severe and come back up when conditions and communications integrity improve.

Lightlink can be used to send messages to other stations in the WP/EMS network as a supplementary communicatins channel to a company's physical line system.

Bundled With Training

For the most part, both the WP and messaging software is bundled, but will be available to current ARC users for a small training fee and the cost of the media, Datapoint said. For instance, the WP package costs $750, which pays for a week of training for one person at Datapoint's Customer Training Center.

The software will be available for delivery by the first quarter of 1980, but Lightlink will not be available until the fall.

Three orders already have been received for the software system from Rotan Mosle, a brokerage firm in Houston; the University of New Hampshire; and the Pacific National Bank in Seattle, Wash. While all of the customers plan to use the system for communications with at least 15 different station locations, the bank hopes to utilize the software to facilitate voice/data integration between about 150 stations.

Datapoint is located at 9725 Datapoint Drive, San Antonio, Texas 78284.

ARC Also Gains Bidirectional Printer

NEW YORK — If you're going to sport a pair of new shoes, why not add a pair of new socks?

That's the philosophy Datapoint Corp. adopted last week when it unveiled a 45 char./sec, microprocessor-controlled bidirectional printer along with its word processing and electronic message system software.

The typewriter-quality printer is available in two models: the 9601, a serial machine that receives data according to RS-232C requirements and is geared for the Datapoint 1500 processor; and the 9602, a parallel printer that connects directly to the I/O bus of Datapoint's Attached Resource Computer (ARC) system.

Both units feature an interchangeable print wheel. Line width, line spacing, forms length and column width can be specified by the user.

The printers will accept forms up to 16.5 in. without using the unit's tractor-feed mechanism and forms up to 15 in. with the mechanism, a spokesman said.

The Model 9601 serial printer costs $4,950; it can be leased for $145/mo over a three-year period. The Model 9602 costs $5,500 or $160/mo.

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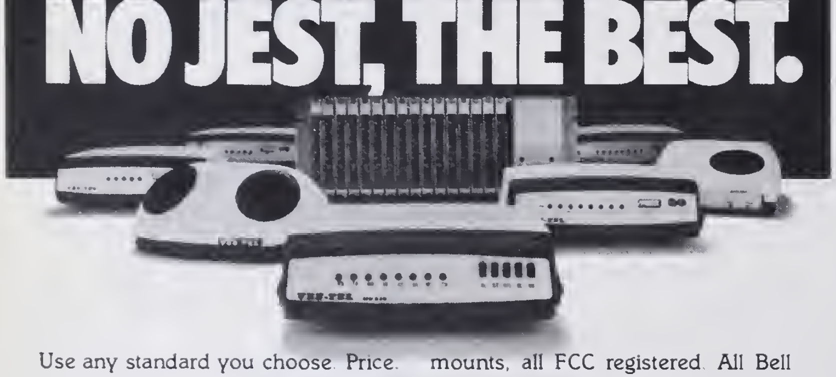

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Says Wrong People Participating

GAO Raps FCC Effort on Accounting Plan

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The Federal Communications Commission's (FCC) effort to develop a uniform accounting system for the telephone industry was sharply criticized by the General Accounting Office (GAO) in a report to Congress released late last month.

The accounting system is widely regarded as a key means of preventing AT&T from using revenues from its monopoly services to underprice competitive offerings — until the competitors go broke. As the GAO put it, "In an industry where one dominant corporation offers both monopoly and competitive services, the advantages of competition are greatly diminished if profits from monopoly services are subsidizing, or cross-subsidizing, the competitive services."

However, detection of such cross-subsidies requires an accounting system that identifies all of the costs related to each communications service. While that is a major goal of the system now being developed at the commission, it won't be attainable until the new accounts are set up and, as GAO's report explains, "the outlook is dim for early implementation — or effective use — unless a myriad of problems is solved."

Basis of Complaints

Essentially, the GAO said the commission has not involved enough of the right people in the development of the uniform system of accounts and has not provided enough material support. Too much of the work has been assigned to FCC economists and lawyers, for example, and not enough to its accountants.

Furthermore, the GAO said, "although some users within the commission were involved in system conceptualization, many — including some with rate review responsibilities — were not. Without precisely defining user needs, a costly and complex system may be established without meeting the needs of users."

The FCC was also criticized for not consulting sufficiently with state regulatory authorities. Currently, the GAO pointed out, most states employ the same accounting system the FCC uses. But if they don't participate in development of the revised systems, the states could develop one or more different schemes, which would add to the carriers' paperwork and make the data less useful since it would be less comparable.

To find out more about this part of the problem, the GAO sent a questionnaire to 53 state regulatory commissions and received replies from 40. A substantial majority of the respondents felt they weren't participating sufficiently in development of the revised system and doubted that their views would have any substantial impact on the final system.

Only seven of the 40 respondents expect to adopt the revised system totally. Among the others, there is apparently widespread opposition to receiving accounting data from the carriers in computerized form — one of the innovations included in the FCC's proposed system.

What may be "the most serious" objection, the GAO said, is that nearly half the respondents believe the costs of the FCC accounting system will outweigh its benefits.

Carriers Unhappy, Too

The carriers are also unhappy with the system, the GAO pointed out: "In the opinion of many, the huge increase in the number of accounts, the inclusion of nonaccounting records and more sophisticated data processing concepts [will] significantly increase [their] costs." Estimates of the cost increase ranged as high as $25 million.

AT&T told the GAO that a new accounting system the telephone company is developing will be far less detailed and complex — and presumably far less costly to implement — than the one being developed by the FCC. Even so, the GAO said, the FCC believes the AT&T system "will not be able to produce information by cost of specific service until the late 1980s."

In the light of that estimate, the FCC's time table for its own system appears rather optimistic. A final system is scheduled to be adopted by next June and put into use gradually over the next three years.

GAO Recommendations

The report offers a number of recommendations designed to shorten the FCC's task. The job should be put in charge of a "sufficiently high" commission official who can "provide continuing and consistent direction."

Moreover, responsibility should be assigned within the commission "for all phases of development and implementation." The FCC, which saw a copy of the report in advance of its release, has promised to make some changes along the lines suggested by the GAO. Among other things, the commission will establish a task force, headed by "a senior staff member," to design the revised system and will "make development of an appropriate implementation schedule a priority assignment of the task force."

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Compared With Dynamic RAM

CCD Chips Found Vulnerable to Cosmic Rays

By Brad Schultz
CW Staff

Charge-coupled device (CCD) memory is far more susceptible to damage from alpha particles, a form of cosmic radiation, than dynamic random-access memory (RAM), according to recently published research.

That conclusion was drawn from experiments conducted at various altitudes with three different memory chip prototypes. The research may help systems designers to enhance reliability in forthcoming processors.

Alpha particles are the gremlins of computer memory. They unexpectedly invert the value of individual memory bits that diagnostic tests will later certify as functionally correct. Such "soft fails" may occur once every 1,000 hours (about six weeks) in large computer systems, according to recent estimates.

That's a very high failure frequency compared with average rates of "hard fails" — physical circuit breakdowns. Each bit on a typical 64K-bit chip is likely to hard fail once every 7.5 billion years, according to an article by J.F. Ziegler and W.A. Lanford in the Nov. 16 *Science*.

The soft-fail problem may limit the extent to which computer chips can be miniaturized successfully because a blast of cosmic rays tends to injure the smallest, highest density chips the most [CW, July 23].

And the particles fall all over the earth — not to mention elsewhere in the universe, where they can injure computers in satellites. Alphas are helium nuclei cast off by atoms in decay. Their bombardment is stronger at higher altitudes where "thinner" air is less able to impede their descent.

Bit for Bit

The study of cosmic damage to dynamic RAM and two sizes of CCD chips may crimp promotion of CCD as a less expensive alternative to RAM technology. Bit for bit, the latter is roughly 100 times faster and 100 times more expensive than CCD memory.

At sea level, a 256K-bit CCD chip suffers some 3,000 soft fails per million hours, according to Ziegler, an IBM specialist in ion beam techniques, and Lanford of the State University of New York's Albany campus.

A 64K-bit CCD chip endures about 600 failures in the same period. In stark contrast, the researchers found only about seven soft fails per million hours with 64K-bit dynamic RAM chips.

Those three estimated rate averages are based on "several simplifying circuit assumptions," Ziegler and Lanford pointed out. "Actual performance will vary with component design and circuit operation."

Lower Stored Charge

CCD memory is much more sensitive to cosmic radiation than RAM because of its lower stored charge. A single alpha particle striking a CCD memory whose bits were all preset to ones would leave a streak of zeros in its wake as it passed through the circuitry, the scientists explained.

In fact, CCD is believed to have the least charge per bit of any current memory technology, they continued. In a sense, a memory bit's charge is a measure of its power to fight the charge of an invading alpha particle.

The charge of 64K-bit and 256K-bit CCD chips is roughly 180,000 and 50,000 electrons per bit, respectively, compared with an estimated 1.5 million electrons per bit for 64K-bit RAM chips.

Altitude, Shielding

Specifically, a memory chip's ability to withstand cosmic rays is decided by the chip's stored charge and the burst of charge migrating from each alpha particle to the chip penetrated. But two other factors determine whether the clash needs to take place at all: the altitude of the computer facility and its shielding.

Ziegler and Lanford conducted their tests at altitudes of 3km and 10km (about 1.8 miles and 6 miles, respectively). "We found large changes in the total error rates from 3-, to 10km, with all interactions increasing," the scientists reported.

"Dramatic increases of soft fails are predicted at airplane altitudes," they concluded. "This altitude effect can be used to accelerate the testing of devices for sensitivity to cosmic rays."

As to shielding, the researchers measured the capacity of concrete to absorb cosmic radiation.

At sea level, a concrete wall 20cm (just under 8 inches) thick allows about three soft fails per million hours with a 64K dynamic RAM chip. That thickness allows about 700 soft fails per million with a 64K-bit CCD chip and about 2,000 soft fails per million with a 256K-bit CCD chip.

A sea level wall 50cm (just under 20 inches) thick allows virtually no soft fails with a 64K-bit RAM, Ziegler and Lanford found. But that wall admits enough radiation to give a 64K-bit CCD chip about 300 soft fails and a 256K-bit CCD chip more than 1,000 fails in a million hours.

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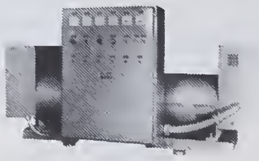

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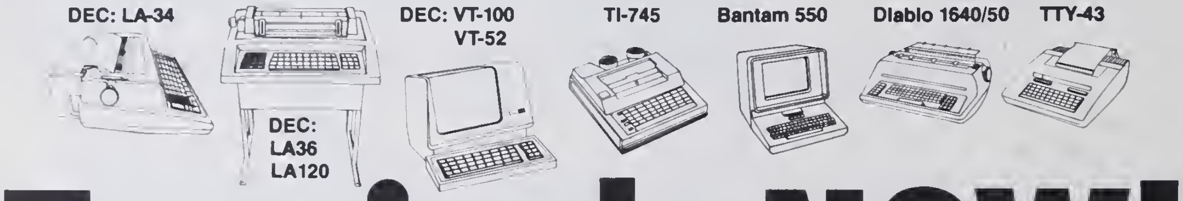

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MIAMI — "Bank Telecommunications '80" is the theme for a workshop sponsored by the Operations & Automation Division of the American Banks Association here at the Omni International Hotel Feb. 10-13.

The workshop will focus on current and future bank applications, services and financial delivery enhancements that can be aided substantially by telecommunications, according to the sponsor.

Speakers include Charles Brown, chairman, AT&T; Rep. Lionel Van Deerlin (D-Calif.), chairman of the U.S. House of Representatives Subcommittee on Communications; Kenneth C. Anderson, chief, U.S. Department of Justice Special Regulated Industries Section; and Philip L. Verveer, chief, Federal Communications Commission Common Carrier Bureau.

More information may be obtained from the Operations & Automation Division, American Bankers Association, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

IBM Claims to Innovations In Manufacturing Arena Disputed in Antitrust Suit

By Connie Winkler
CW Staff

NEW YORK — IBM's innovations in manufacturing are what makes IBM successful, according to IBM's corporate vice-president of manufacturing, Robert B. Dunlop.

Dunlop, who recently testified 10 days in the U.S. vs. IBM antitrust trial here, called an innovation any product, part or process that was not commercially available to IBM, and he listed 74 of which he knew personally. He also explained how IBM uses computers to run its manufacturing: first, in the corporationwide manufacturing control system; second, in satellite computers at each plant, some of which are dedicated to specific process control.

IBM lawyer Paul C. Saunders specifically asked Dunlop what effect these innovations had on IBM's excellence of manufacturing, but Judge David N. Edelstein disallowed the question after a Justice Department objection.

Patents as Evidence

Saunders also tried to get admitted into evidence 99 patents issued to IBM. He argued the patents are issued by the government patent office and must be presumed valid. Of all patents issued, only a miniscule percentage are found to be invalid, Saunders said.

Justice Department lawyer John J. Greene argued 70% of all patents litigated are determined invalid by courts, and that patents are not trustworthy accounts of who was truly responsible for an invention. "The mere fact a patent has been issued is relatively unimportant," said Greene.

IBM in the past has tried, unsuccessfully, to get patents reconsidered, but refused to admit the manufacturing patents as evidence.

Interdependence Theme

Dunlop, who testified in lengthy and animated fashion, talked about "interdependencies" between the 39 worldwide IBM manufacturing plants themselves and between related development labs.

Because of the large number of dependencies he listed and because the interdependence theme has just been raised in the trial, Dunlop's discussion sounded like a testimonial why IBM should not be broken up into separate companies — a subject apropos to settlement talks in this on-again, off-again case in Washington, D.C.

The Justice Department contends IBM could depend on outside vendors instead of other IBM plants, and Greene elicited much testimony about IBM's relationship with other vendors.

On redirect examination, however, Dunlop said IBM cannot always use outside vendors for qualitative reasons, such as cost or the fact a process or product is proprietary.

The 29-year-IBM employee also talked about demand for the 360 and customers' satisfaction with it. The government countered with IBM internal documents relating to the 360/30 showing "customer dissatisfaction conditions" in late 1965, particularly regarding the programming.

Although IBM initially received a spurt of orders in April 1964 after the 360 announcement, the government argued the orders dropped below forecasts by 1966. Greene introduced several documents showing drops in 360 demand.

Dunlop countered IBM could not produce enough modules, cards and boards for the 360 and therefore did not fill additional orders when a customer deferred on the 360. "We were trying to build a safety factor between commitments to customers and our schedules," Dunlop said.

Ruth Davis the Last DPMA 'Man of the Year'

PARK RIDGE, Ill. — Dr. Ruth M. Davis will be the last Computer Sciences Man of the Year, according to the Data Processing Management Association (DPMA).

That organization's members voted to change the title of the annual award to the "Distinguished Information Sciences" award at the recent international DPMA conference in San Diego. The action was taken to better reflect the consensus of its membership, according to George Eggert, international president.

Instituted in 1969, the annual award is given to a recipient whom the council deems outstanding in expertise. The nominations are taken from local DPMA chapters, although the award is not restricted to association members.

The first to receive the Man-of-the-Year award was Navy Capt. Grace Murray Hopper, while this year's award was presented to Davis, the newly appointed U.S. Assistant Secretary of Energy. Davis and Hopper are the only two women recipients of the award to date, but may not be the last.

Although an association spokesman said the DPMA has received no criticism over the title, many in the industry felt it was outmoded and should be changed.

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GAO Tells a $970,000 Horror Story

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — One unhappy federal agency recently spent almost $1 million on a software development contract that produced no usable software, the General Accounting Office (GAO) reported this month.

The botched contract was detailed in a series of case studies included in a GAO report on federal mismanagement of outside software development (see story on Page 1). The horror stories were included, the GAO said, so "others may be helped by the experiences described."

The million-dollar boondoggle resulted from an agency contract to design an integrated personnel/payroll system originally contracted out for $445,158 and 15 months. The agency terminated the contract after 28 months with nothing to show for an expenditure of $970,000.

When it issued the request for proposals for the software, the agency was still in the initial stages of system development. "It had not fully developed user requirements or system specifications for any of the proposed software," the GAO said.

The agency awarded a fixed-price contract requiring phased software development, but did not require agency approval of a completed phase before work continued. The contract did not contain acceptance testing procedures and did not identify quality criteria for documentation.

Changes and Delays

Delivery dates, the scope of work and costs were revised several times. The contractor complained of extensive changes requested and inexcusable delays caused by the agency.

Agency officials acknowledged that some of the changes requested were not clearly identified in the contract and that others were obviously outside the scope of the work, the GAO said.

The contractor further maintained that the agency took too much time to review products submitted for approval. The agency admitted the delays, but blamed those delays on the poor quality of the documentation under review.

The contractor did not clearly understand the software systems the agency desired because the contract did not specify system requirements or performance criteria. Both agency and contractor staff agreed that the contract was not specific, that the terminology was vague and that many systems requirements were not clearly identified.

The contractor did not wait for approval of completed phases before proceeding. When the agency rejected the general system design, the contractor had to scrap work already done on detailed system work.

User requirements were never adequately defined and frozen, and changes delayed completion schedules, increased contract costs and caused the agency and the contractor to disagree about whether the new requirements were included in the original scope of work.

Thirteen Amendments

The contract was amended 13 times to provide for additional work to be done to add or delete requirements and to reimburse the contractor for the extra costs resulting from agency-caused delays. The amendments were to increase the cost of the contract to $1,037,448.

The agency eventually became convinced that the contractor could not deliver at an acceptable time and cost, canceled the contract and tried to withhold payment for poor performance.

A negotiated settlement price of $970,000 was agreed upon. None of the software was ever used by the agency.

To Help States Plan Budgets

OMB Testing Federal Aid Reporting

By Jay Woodruff
CW Staff

LEXINGTON, Ky. — State and federal governments have begun a test of 14 federal agencies' ability to inform the states of all federal aid they and their subdivisions receive.

The test will collect agency data, format it as a series of reports on magnetic tape and forward the reports to 13 states' central DP organizations. The information is useful in helping the states plan budgets based on the amount of federal monies they receive.

The test was authorized last year by an act of Congress and is being conducted by the Office of Management and Budget (OMB) with the aid of the National Association for State Information Systems (Nasis).

Experience Planned

Experience gained from the test, which covers the fiscal quarters ending June 30 and Oct. 30, 1979 and Jan. 30, 1980 will "get federal agencies up to speed to report the information" and iron out any bugs before the system is expanded to cover all 50 states for the beginning of the fiscal year in October 1980, according to Nasis' executive director, Carl W. Vorlander.

This is the third time since the late 1960s that the federal and state governments have tried to work together, but this time the OMB has pledged to pressure the federal agencies to produce information that they were often reluctant to prepare, Vorlander explained. This system should be more cost-effective and less unwieldy than previous attempts, he added.

Twenty-Two Elements

The agencies are being asked to produce 22 elements of information on aid they give to each state. A form asks for the name of the federal agency giving the funds, the state organization and county that receives them, the amount of money given and the purpose of the aid.

They will also provide information on matching funds, when they are scheduled to run out and the congressional district involved.

An agency reports on any action that takes place during a fiscal quarter to the Community Services Administration of the OMB, which then compiles it (in batch) and runs a report program breaking down the information for each agency and each state involved.

The data is processed on a 2M-byte IBM 360/50 and output on Data 100 Corp. printer terminals, according to L.G. (Buck) Burgess, chief of the Federal Information Exchange System, an OMB agency. The mainframe is adequate for present needs, but the organization is planning on larger IBM systems for the increase expected when all 50 states and additional federal agencies are brought into the program.

Further expansion may be required if the system is changed to an interactive one, although that possibility is not now under active consideration, Burgess indicated.

Reason for Test

The test period gives both the federal agencies and the state information systems organizations a chance to learn about the system and make it work before it is implemented throughout the country, Burgess said.

For one thing, the federal agencies require "a lot of education" to understand the importance of providing information on aid they give to states. "They don't see the need for it," Burgess said of some of the agencies with which the OMB has been dealing.

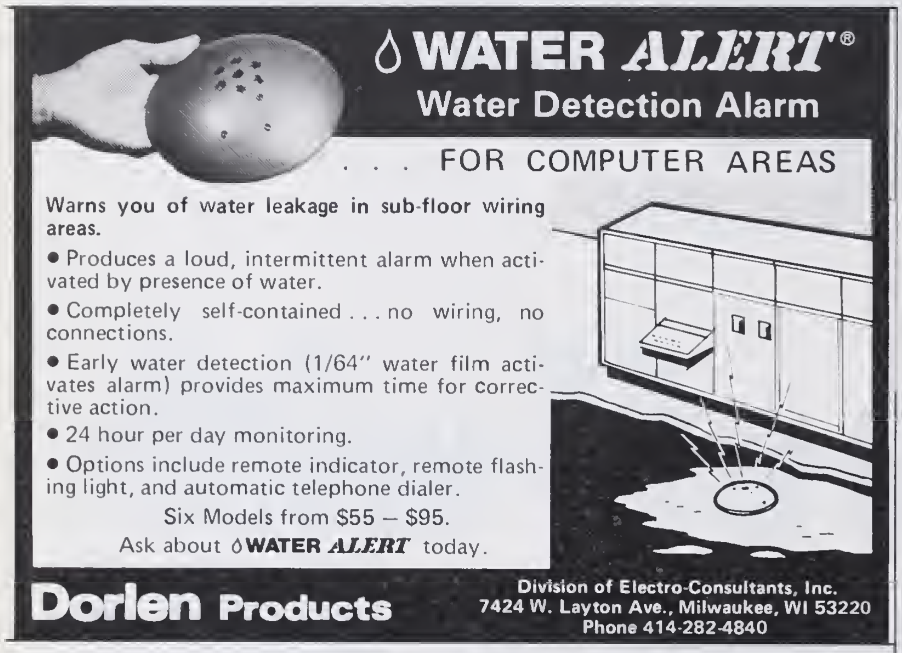
Some agencies need to be convinced that instead of sending out great volumes of reports in paper form each year, they need only to extract data from existing agency financial systems, he said.

The state DP installations can use the test to determine the accuracy and completeness of the data received from the Community Services Administration. And though Burgess expects the system to be operational for all the states in October of next year, it could be two or three years before it runs smoothly and at its full potential, he said.

More Information

The system should provide an additional piece of information that has previously been difficult to find out. Any procurement action over $10,000 must be reported to the procurement data center located at the Pentagon, which provides the information to OMB.

So if General Motors gets a $100 million contract, for instance, policy makers in each state will be able to determine what subcontracts their state is awarded from the large contract, Burgess said.



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Lengthy Delays, Cost Overruns

GAO Cites Bungled Federal Software Contracts

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Large cost overruns and lengthy delays are common to software development contracts awarded by federal agencies, a recent government study found.

"Immediate management attention" is needed to prevent the loss of millions of dollars in federal software development contracts, the General Accounting Office (GAO) said in a report issued earlier this month.

"A substantial number" of these contracts "do not produce software that is useful to the customer," GAO said. "Also, even some of the delivered software that can be used must be reworked by agency staff after delivery before it works satisfactorily."

The GAO was unable to estimate the dollars lost through bungled software contracts, but noted in its survey of 133 federal project officers that more than 50% said dollar overruns are either "fairly common" or "very common" to the government's outside software work.

"It is estimated," the report added, "that federal agencies contract for several hundred million dollars of computer software development by software vendors and other government agencies annually." On a national basis, public and private organizations may have spent as much as $2.6 billion on such contracts in 1978 alone, GAO said.

The GAO found that "certain things causing problems for both contractors and agencies were common to all reviewed contracts that had trouble." But the primary problem is lack of guidance for contracting for software, the report said, and it recommended specific steps for the General Services Administration (GSA) and the National Bureau of Standards (NBS) to take to help agencies develop software through outside contractors.

"Agencies also overestimate the state of system development they have reached before they contract," the GAO continued. "Often, an agency's preliminary work is inadequate and must be done again by the contractor.

"Agencies quickly overcommit themselves and fail to control contractors through strict phasing. They will sometimes commit themselves to the entire software development, including writing, testing and delivering the computer programs, before they even have the user requirements . . . clearly identified," GAO said.

'Changes and Afterthoughts'

Another common problem the GAO found is that "agencies do not manage software development contracts during execution. Management failure while work is being done included excessive changes and afterthoughts, failure to inspect intermediate stages of work and failure to require progress reports from the contractors.

"Contractual testing requirements are often sketchy or absent," the report said. "Agencies accept and pay for software without adequately inspecting and testing it." Furthermore, "communications difficulties and delays occur when contractors have not identified a single source for answers or proposed changes and interpretations of requirements."

The study also found that "problems arise because agencies do not adequately specify or enforce contract clauses for recovery in the event of poor performance by the contractor, and contractors fail to provide adequate software documentation."

Proposed Remedy

To remedy the situation, the GAO proposed a checklist for agency management covering the five phases of software development programs: precontract, contract, proposal evaluation, performance period and postcontract.

Additionally, the report recommended that NBS and GSA issue specific guidelines "to assist federal agencies in recognizing and dealing with the unique factors added to custom software development when it is done by contract." A review of present guidelines found they deal almost exclusively with commercially available software, GAO said.

Some areas GAO said new guidelines should cover are:

- Internal management practices to write, manage and monitor the contracts.
- The tailoring of contracts to stages of systems development.
- Stipulations on phasing software development and review and approval procedures for each phase.
- Performance specifications to clarify quality requirements.
- A formal quality assurance program for contractors that is documented and subject to audit.
- Definitions to properly define documentation standards, adherance to programming language standards, acceptance testing procedures and satisfactory contractor performance.
- The handling of changes in specifications with minimal disruption.

The GAO also recommended that agencies "train project managers in such overall skills necessary to manage those contracts as software, contracting and management."

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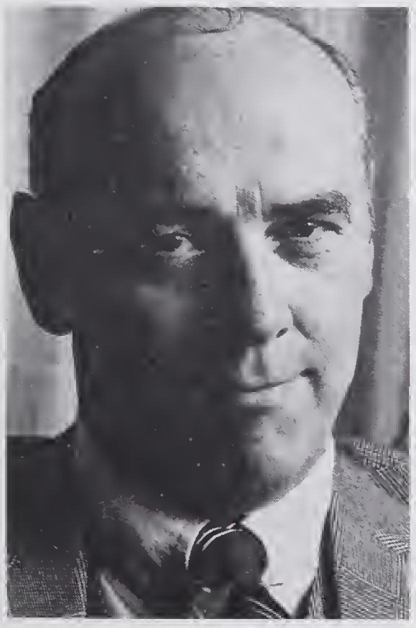

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Computer Files Found Not Exempt From FOIA

By Marcy Rosenberg
CW Staff

SAN FRANCISCO — An appellate court here dealt a blow to the argument that information recorded in computer-readable form is exempt from disclosure under the Freedom of Information Act (FOIA).

Ruling on a suit to obtain data on computer tapes the Internal Revenue Service (IRS) uses to select tax returns for audit, the Ninth Circuit U.S. Court of Appeals held the FOIA applies to computer tapes to the same extent it applies to any other documents.

Two individuals, Susan and Philip Long, sued the IRS to get full details of its Taxpayer Compliance Measurement Program (TCMP), from which the IRS developed its Discriminant Function (DIF) system. This is a series of mathematical formulas used to identify returns with a high probability of tax error.

The Longs did not say why they wanted the information, nor are they required to under the FOIA.

While the IRS did disclose the statistical tabulations based on TCMP, it refused to reveal the source material contained on data tapes and check sheets, arguing that computer tapes were not public records under the FOIA, were exempted as tax returns and would cost too much in time and money to sanitize.

The check sheets, prepared manually by auditors, contain taxpayer name, address, social security number and financial data, an IRS spokesman said. Containing the same information minus taxpayer name and address, the computer data tapes are written in a programming language the spokesman could not name.

Primarily interested in the data tapes, the Longs asked for check sheets only when needed to interpret the tapes and asked the IRS to delete taxpayer-identifying information from both types of documents.

Court Ruling

Although the U.S. District Court for the Western District of Washington in Seattle upheld the IRS' right to withhold the source material, the appellate court refuted several of the agency's arguments and instead ruled:

- Computer tapes are "records" subject to full disclosure under the FOIA.
- The raw data, as well as the statistical tabulations, should be disclosed because "we find no evidence in the record . . . that the IRS statistics encompass every useful analytic conclusion that could be drawn from the information."
- The editing required to delete taxpayer-identifying information from the tapes and check sheets would not place an unreasonable cost burden on the IRS.

The agency estimated the cost to sanitize and reproduce the documents at $160,000. On appeal, however, it was learned that $150,000 of this sum was the estimated cost to edit and reproduce all 200,000 check sheets, something the Longs did not want.

- The tapes and check sheets, as requested, were not exempt as tax returns because Internal Revenue Code rules for exempting records from disclosure do not apply to information that does not identify a particular taxpayer.

On the question of identification, however, the appeals court remanded the case back to district court to further examine the IRS' contention that even without names and social security numbers, tapes and check sheets contain information that could indirectly identify taxpayers. The district court has yet to schedule the case.

The appellate ruling in Long vs.IRS joins other judicial decisions that indicate the courts are accepting information in machine-readable form as the equivalent of written records, according to the "Computer Law and Tax Report" (CLTR).

Also significant, CLTR pointed out, is that this ruling supports several earlier court decisions that an analysis made by computer cannot be used as evidence unless both the programs and the source data can be examined by the opposing party.

Source data as well as programs would be necessary to cast doubt on the validity of a computer record, the report said, adding if one can prove there are undocumented patches or changes in a computer program, the resulting records "can draw pretty skeptical looks from a jury."

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DP Outage Crashes System, Halts Commodities Trading

By Tom Henkel
CW Staff

CHICAGO — An aging uninterruptible power supply (UPS) brought commodities trading to a halt here two weeks ago when it gave out, crashing the computer system at the Chicago Board of Trade and closing the exchange two and a half hours early.

The Board of Trade refused to name the vendor of the UPS, but its information systems manager, Bob Jirout, said the UPS was eight or nine years old and supported three IBM 370/148 processors.

"We lost all power coming into the computer room," Jirout recalled. "After a few minutes, we had power, but we were not able to control it. We had 300 amps, but we are only able to handle 200. The problem was smokescreened, and it took electricians a few more minutes than normal to identify the problem."

A switch in the UPS had failed. To repair the system, the electricians bypassed the UPS and tied power directly into the CPUs — a process that took almost two and a half hours.

"To bring the system back up, the electricians had to take the UPS off-line and recable and patch around it," Jirout explained.

The system crashed Nov. 19 at 11:30 a.m., closing the Board of Trade until 1:15 p.m., its normal closing time. At 1:15, markets were opened for five-minute intervals on a staggered basis to determine commodities' closing prices.

A Board of Trade spokesman experienced in handling computer problems on the trading floor said last week's crash rendered the trading house helpless since it could not transmit prices outside the trade building. When price transmission is still possible, the exchange goes to a manual internal system — using chalk boards.

Commodity prices at the time of the crash were reported to international markets via a backup system that ties into Western Union Telegraph Co. lines via teletypewriters.

Despite the inconvenience to Chicago area traders, the Board of Trade was lucky, Jirout said. No data was lost, and missed price quotations were updated during the five-minute periods after 1:15 p.m.

Since trading was unusually light because of the early shutdown, the DP department was able to catch up on lost time later that evening. The Board of Trade opened for business as usual the next day.

No Decision

Whether the Board of Trade will fix the aging UPS is yet to be determined. Its vendor has been asked to come in and take a look at it, but Jirout fears the worst: "It's old and the batteries are old. It just may be too costly to bring back up."

If the Board of Trade's UPS is really gone for good, the DP department will have to make do until the exchange opens its new building, now under construction. Plans are being made to install a new UPS there, Jirout said.

Jirout was pleased that the UPS' failure didn't cause serious problems.

The Board of Trade warned traders of the CPU crash via the backup Western Union system. It also sent word through radio and television announcements that the market would close.

Hence, "anybody that was paying attention shouldn't have been affected" by the closing, Jirout said.

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As a Senior Management Systems Consultant at SRI International, he has applied his unique knowledge to advancing the state of information security and has assisted many business and government clients with their security programs. He has compiled over 600 case histories of actual computer crimes which serve as the basis for analyzing common system weaknesses and for developing preventive measures.

Mr. Parker is Chairman of the Professional Standards and Practices Committee of the American Federation of Information Processing Societies and is a consultant to the US Congress' Office of Technology Assessment.

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Calendar

Jan. 3-8, San Francisco — **American Association for the Advancement of Science (AAAS) Annual Meeting.** Contact: AAAS, 1515 Massachusetts Ave. N.W., Washington, D.C. 20005.

Jan. 4, Las Vegas — **Power Conversion Products Council International (PCPCI) Winter Meeting.** Contact: PCPCI, 17th Floor, 435 N. Michigan Ave., Chicago, Ill. 60611.

Jan. 7-8, Los Angeles — **Statistical Analysis Systems (SAS) Basic Two-Day Course.** Contact: SAS Institute, Inc., P.O. Box 10066, Raleigh, N.C. 27605. Also being held Jan. 22-25 in Houston.

Jan. 7-9, Honolulu — **Pacific Telecommunications Conference (PTC)**, sponsored by the State of Hawaii Department of Planning and Economic Development, East-West Communications Institute, Hawaii Telecommunications Association, Hawaiian Telephone Co., Communications Society of the Institute of Electrical and Electronics Engineers, Inc., Public Service Satellite Consortium and the University of Hawaii. Contact: Richard J. Barber, PTC '80, University of Hawaii, 2424 Maile Way, No. 704, Honolulu, Hawaii 96822.

Jan. 7-11, Houston — **Data Base Concepts & Design.** Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

Jan. 10-11, New York — **Data Processing for Secretaries and Administrative Support Personnel.** Contact: Management Resources International, Inc., 6621 Electronic Drive, Springfield, Va. 22151.

Jan. 13-16, New York — **National Retail Merchants Association (NRMA) Annual Convention and Business and Equipment Exposition.** Contact: NRMA, 100 W. 31 St., New York, N.Y. 10001.

Jan. 13-16, Orlando, Fla. — **Optical Character Recognition Users Association (OCRUA) Conference.** Contact: Sally Williams, OCRUA Conference, 804 W. New Haven Ave., Melborne, Fla. 32901.

Jan. 14-15, Dallas — **Data Administration/Data Dictionary.** Contact: Performance Development Corp., 1101 State Road, Building P, Princeton, N.J. 08540.

Jan. 14-16, Orlando, Fla. — **Computer Law Skills — A Practical Guide.** — Contact: International Computer Negotiations, Inc., 1331 Palmetto Ave., Winter Park, Fla. 32789.

Jan. 14-6, Houston — **DP for Managers and Professionals.** Contact: Management Resources International, Inc., 6621 Electronic Drive, Springfield, Va. 22151. Also being held Jan. 28-30 in Fort Lauderdale, Fla.

Jan. 14-18, Nashville, Tenn. — **Software Physics Capacity Management Course and Workshop.** Contact: Institute for Software Engineering, P.O. Box 637, Palo Alto, Calif. 94302.

Jan. 15-18, San Francisco — **Computer Communications Networks.** Contact: Integrated Computer Systems, Inc., 3304 Pico Blvd., Santa Monica, Calif. 90405.

Jan. 17-18, Arlington, Va. — **Writing Procedures Course.** Contact: SAS Institute, Inc., P.O. Box 10066, Raleigh, N.C. 27605.

Jan. 21-22, Minneapolis — **Computers in Elementary Education.** Contact: Association for Educational Data Systems Workshop, 1201 16 St. N.W., Washington, D.C. 200036.

Jan. 21-23, Philadelphia — **Data Processing for Non-DP Executives.** Contact: Institute for Science and Public Affairs, 1370 Ave. of the Americas, New York, N.Y. 10019.

Jan. 21-23, Washington, D.C. — **Structured Analysis and Design.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Jan. 21-23, San Francisco — **Microprocessors in Systems Design.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Jan. 21-25, Houston — **Computer Contract Negotiation.** Contact: Brandon Consulting Group, 1775 Broadway, New York, N.Y. 10019.

Jan. 22, New York — **The Digital Future of the Telephone Network.** Contact: Probe Research, Inc., P.O. Box 251, Milburn, N.J. 07041.

Jan. 23-25, New York — **Data Communications.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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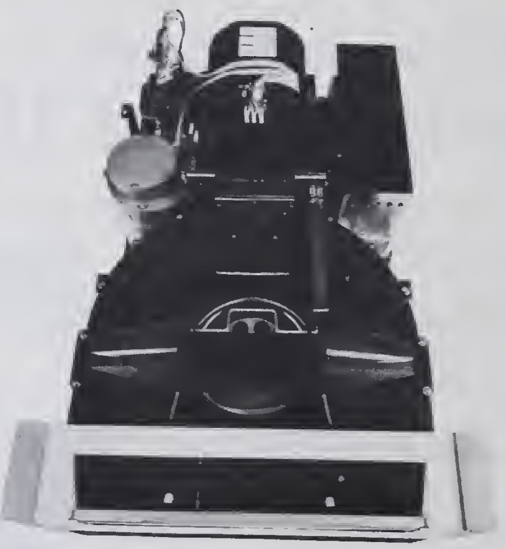

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McDonald's Giving Employees a Career Break

By Jay Woodruff
CW Staff

OAK BROOK, Ill. — McDonald's Corp., probably the nation's largest employer of teenagers, is helping them and its other restaurant workers plan their academic futures with its six-month-old Programmed Assistance in Career Exploration (Pace) program.

Now being administered in Maryland, Virginia, the District of Columbia, Delaware, Michigan, Illinois and in Toledo, Ohio, Pace is set up to guide the fast food giant's employees into technical schools, colleges and vocational institutions that will help them pursue their chosen careers, Pace director Pat Novick said.

The Pace program is run on an NCR Corp. 101 at Joliet Junior College in Joliet, Mo., but is being converted to the school's Prime Computer, Inc. Model 650. The program is a modified version of a larger nationwide program for participating colleges across the U.S., used by 200,000 students and called the Vocational Information Program, according to John Cripe, who runs the Pace computer programs.

A student begins to use Pace by selecting six careers out of a listing of 500. The choices are processed by the Joliet system and a one-page resume for each choice is returned to the student.

After the student narrows the choice down to a specific career, Pace sends him a printout ranging in size from 15 to 20 pages that lists — in accounting, for instance — the activities of the job, types of accounting, job requirements, working conditions, salary levels, forecasts of employment probabilities for a qualified person and who or what organization to contact for more information.

It also provides the student with a search list of four-year colleges or vocational and technical schools (there are about 7,000 such schools in the U.S.) that match the student's specific interests.

The system can also be ordered to produce a general financial aid search for the prospective students.

Started in D.C.

The program began "in an exploratory fashion" a year ago in Washington, D.C. That location was chosen because of its concentration of inner city youths and because of the number of women there returning to the work force.

The enthusiastic response prompted the hamburger empire to initiate the program in full force a half year ago, Novick said.

Novick said the program, which has also been helpful to older people working in the restaurants but wanting to return to school, has grown sufficiently to move it out of McDonald's public affairs department into a part of the firm's daily operations.

Call for Papers

INTERNATIONAL MICROCOMPUTERS MINICOMPUTERS MICROPROCESSORS/DATACOMM '80 CONFERENCE, Geneva, Switzerland, June 17-19.

The subject matter includes satellite communications, packet-switching networks, communications protocols, network control and measurement systems management, distributed processing systems, the human-computer interface, status of European commercial networks, the impact of high-level languages on micro and mini systems, software development tools and techniques, memories, microcomputers in industrial automation and debugging of microcomputer systems.

Abstracts should be sent by Feb. 15 to Dr. Fred Morritz, Industrial & Scientific Conference Management, Inc., 222 W. Adams St., Chicago, Ill. 60606.

THE INTERGOVERNMENTAL BUREAU FOR INFORMATICS (IBI) WORLD CONFERENCE ON TRANSBORDER DATA FLOW POLICIES, Rome, June 23-27.

Papers are invited on the five major objectives of the program: state of data flow developments, legal and social implications, economic dimensions, regulatory environment and interdependence through global information communication. Authors are requested to indicate where their contribution would best fit in the structure.

Intention to submit a paper, together with a provision title and a brief abstract, should be submitted as soon as possible. In return, authors will receive notice about the relevance of the subject in the conference program and instructions for production of the full paper.

More details are available from IBI Headquarters, P.O. Box 10253, 00144 Rome, Italy.

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During System Conversion

Pennsylvania Takes Step Back to Go Forward

By Tom Henkel
CW Staff

HARRISBURG, Pa. — Where there's a will, there's a way — even if it means going back to a manual system.

That's what the Pennsylvania Bureau of Motor Vehicles (BMV) decided to do to keep its operation running while it installed a new data base.

In an 11th-hour decision, the BMV decided it would be better off using a manual system temporarily to process drivers' licenses and learners' permits than to shut down for up to two weeks.

The BMV is switching from a semicomputerized system that requires drivers to send applications for learners' permits and license renewal forms to the state capital here for processing. The bureau developed its own applications programs in hopes of creating an on-line data entry system running on a dual-processor IBM 370/168 under IMS/VS.

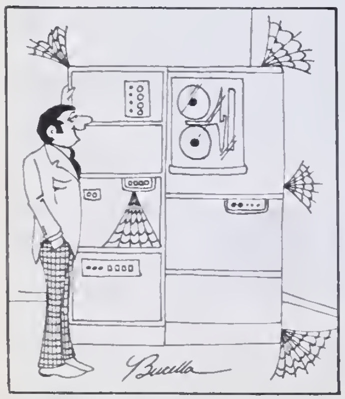
Drivers can now mail permit applications and renewal forms to the main BMV office in Harrisburg or go in person to branch offices in Pittsburgh or Philadelphia. At those sites, the permit applications and renewal forms can be processed on the spot, according to Millie Sheesley, who is directing the project from the BMV's System Planning and Support Unit.

Two Problems

Before the system could get into full swing, the BMV had a bit of a problem. While the applications programs were running on the Harrisburg CPU, the two branch offices didn't receive the IBM 3286 printer terminals that go along with the new data base.

Aside from the obvious problem of the BMV workers in Pittsburgh and Philadelphia not having the slightest idea how to run the printers, the BMV had another problem. Most states use a driver's Social security number to identify him for recordkeeping purposes, but Pennsylvania generates its own 8-digit numbers from its central computer system.

The branch offices couldn't use the computer-generated numbers until the printers were installed Nov. 8 for Philadelphia and Nov. 15 for Pittsburgh.



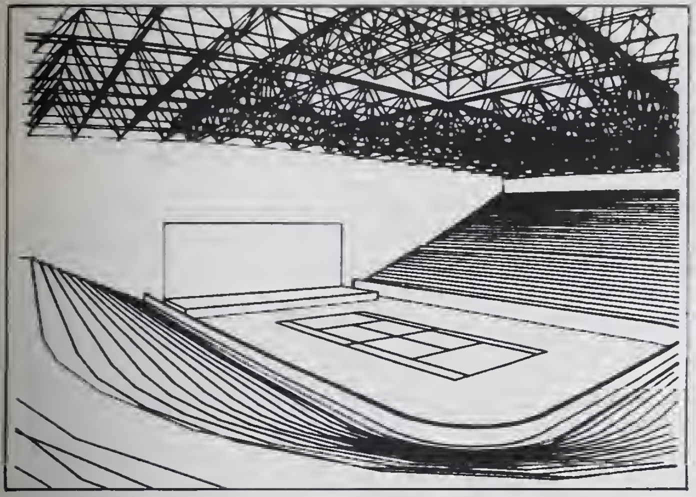
'Enjoy Your Vacation?'

Instead of shutting down the branch offices until the printers were installed, the BMV decided to set aside a block of operators' numbers for the two branches to use until they were ready to hook into the Harrisburg system. Until then, drivers' licenses and learners' permits were typed and the information was sent to Harrisburg to be entered on the system.

Despite the temporary problems, the BMV's director, Doug Tobin, said the conversion was worth it. Pennsylvania drivers are better off because the system will speed the processing of license renewals and permit applications — it could take up to three weeks for an application to make the round trip to Harrisburg.

The state is better off because the new system ties into other state agency systems to immediately flag a renewal application if a driver's license has been suspended because he accumulated too many traffic tickets (Pennsylvania is on the point system).

Under the state's old system, drivers' licenses and points accumulated from traffic violations were stored on separate programs. Each license renewal (then processed on cards) had to pass through the system twice — once to update BMV files and once to check for points or outstanding traffic tickets, Sheesley said.



The Proposed Sydney Haymarket Entertainment Center

Animated Graphics Lets Architects Get Feel of Buildings From Inside

SYDNEY, Australia — Computer-animated graphics are complementing the sketches used by architects to give clients a visual impression of proposed buildings — from the inside.

From the artist's drawing, the computer "draws" a series of sketches — each from a slightly different angle — which are assembled into an animated film. The film acts as a guided tour for clients, giving them the impression that they are walking through the building.

Such a computer technique is used by Easinet, a computer time-sharing service for engineers and architects established by Engineering and Scientific Computers Pty. Ltd., which in turn is a subsidiary of Miller, Milston and Ferris Pty. Ltd., consulting engineers.

Easinet uses a Data General Corp. Eclipse S/130 processor to sketch building interiors on CRT terminals. In comparison, Dr. Barry Westlake, manager of Easinet, pointed out that conventional artists' sketches are time-consuming and costly and do not accurately represent the full visual impact of a new building.

Westlake noted that this work does not replace the creative design efforts of the architects, but concentrates on perfecting the physical details of their sketches.

Every Seat Checked

By using computer-animated graphics and computer terminals, the internal outlines of the building that are not shown in the artist's impression are revealed to the client. This gives the added advantage of facilitating any changes that must be made to a planned structure.

In their work as structural engineers, Miller, Milston and Ferris used computer graphics for the prosposed entertainment center at Sydney's Haymarket. Using the S/130 computer system, engineers designed the 12,000-seat auditorium with no intermediate columns. They programmed the computer to check the position of every seat to ensure that every person would have an unobstructed view.

In addition, the interactive minicomputer system allowed engineers to determine precisely the best location of the stage and lights.

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The plotter is so versatile that it can be easily used in both OEM and end-user applications. HP includes important features to let you implement graphics on your system easily and quickly. Features like automatic pen selection, internal scaling, digitizing, internal character set selection and dashed lines. There's even an automatic paper advance model (7220S) that plots, cuts and stacks your graphics for unattended operation.

In addition to the A3 (11" x 17") 7220 Plotter, HP also offers the low cost Model 7225A, an A4 (8½" x 11") high quality plotter with RS-232-C hardwire connection. And it uses the same plain-talking HP-GL language. A plug-in module customizes the plotter to your computer, desktop computer or intelligent instrument system.

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PBS to Air Documentary On Micros in Classroom

SAN FRANCISCO — Public Broadcasting Service (PBS) will broadcast a one-hour documentary on microcomputers in the elementary school classroom on Jan. 6.

Comprised of interviews with parents, teachers, computer researchers and other consultants, the show will analyze the recent growth of computer use in schools. Included in the documentary is a child's-eye view of the implications of microcomputers in education, PBS said.

Produced under the technical direction of Robert Albrecht, the show, entitled: "Don't Bother Me, I'm Learning," was made through KQED-TV here.

Special segments include a presentation on how microcomputers can simulate real-world situations to help children learn and think. It also looks at the future of microcomputing in education in terms of cost, changes and students' reactions.

The show is underwritten by Bell & Howell Corp. and is recommended by the National Education Association and the Children's Television Workshop, according to PBS.

Guide Provides Monthly Updates On EFT Developments

WASHINGTON, D.C. — A looseleaf, monthly updated reference guide covering the lastest legal and regulatory developments in the electronic funds transfer (EFT) arena is being offered by Card Services, Inc.

Written by lawyer Robert C. Zimmer and Theresa A. Einhorn, "The Law of Electronic Funds Transfer" is sponsored by the Electronic Money Council — a multiindustry group of organizations that provide EFT delivery services.

Indexed and tabbed, the guide presents and analyzes federal and state laws and regulations, judicial decisions and adminstrative rulings affecting EFT operations, a spokesman said.

Chapter Headings

Chapters include: authority of providers, branching restrictions, commercial rights and liabilities and consumer protection laws.

The EFT volume costs $325 with the monthly update service and $200 without the service. Quantity discounts are available for more than one subscription.

Card Services is located at Suite 215, 1775 K St., N.W., Washington, D.C. 20006.

Interface '80 Set for Miami

MIAMI BEACH, Fla. — Interface '80, the eighth annual communications, decentralized processing and networking conference, is scheduled at the Miami Beach Conversion Center here March 17-20.

Sponsored by The Interface Group, more than 250 exhibition booths and 60 conference sessions are planned, a spokesman said.

Interface '80 costs $95 for 2-4 days, $60 for a single day and $10 for the exhibit only. The single and multiple day rates include admission to the exhibition, The Interface Group said from 160 Speen Street, Framingham, Mass. 01701.

DP Firm Formed In Joint Venture

FARMINGTON, Conn. — A joint-venture computer services company has been formed to provide contract programming services to users in Connecticut and adjacent areas and ultimately offer nationwide services.

The Systems Group was formed by four Connecticut businessmen: Richard S. Mathews, president of Mathews & Co., Darien; Don Berry, president of Management Concepts, Inc., Farmington; John Headburg, president of Business Computer Systems, Inc., Newington; and Jerry O'Connell, president of Structured Systems, Inc., Simsbury.

The companies consist of DP consulting and minicomputer and mainframe computer installation service firms. The new firm will also provide support services to the partners' respective companies.

The new company is headquartered at 784 Farmington Ave., Farmington, Conn., and also has a branch office at 108 Old Kings Highway North, Darien, Conn. 06820.

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AAA System Speeds Aid to Stranded Motorists

By Jay Woodruff
CW Staff

CHESTNUT HILL, Mass. — The Boston area division of the American Automobile Association (AAA) has become the third branch of the AAA to use a computer to improve service to stranded motorists.

It uses a system developed by the information services department at the AAA's national headquarters in Falls Church, Va., and has run it on the local branch's minicomputer system since August, according to Liam Whyte, director of member services here.

The Chestnut Hill AAA uses a Honeywell, Inc. Level 6 minicomputer, Honeywell printers and Lear Siegler, Inc. CRT terminals. The minicomputer has been in place for five years, so it was necessary only to add additional terminals and printers, as well as the software from headquarters, to bring the system into being, Whyte said.

Alex Hassol, one of AAA Boston's dispatchers, refers to a CRT to determine which of the listed service stations can most easily handle a call for service from a stranded motorist.

It's very new to us, going from a totally manual system where we filled in the blanks on a printed form, in any order, including address, phone number and so on," he said.

"Now, you have to input the information in order. Our biggest problem has been in adapting to the rigid format and the 'tentative' attitude of operators toward the system," he explained.

Although operators are still learning to operate the system proficiently in time for the expected crush of calls this winter, the system has already proven better and easier to use than the manual system it replaces, the director said.

One of 16 call receivers no longer has to fill out a form when a motorist calls in to the Emergency Road Service department. Instead, information on the type of problem, the car's location, caller's name and number and other information, is entered on the CRT.

When the call receiver passes the information on to a dispatcher, the computer adds the names of local garages close enough to help the motorist so the dispatcher can quickly call one of them without having to refer to a directory.

If the motorist calls again before help arrives, either to inform AAA of a new phone number, to change or add information on the car's ailment or to ask why service has not arrived on time, the operator can immediately access all information gathered since the first call. The operator can then provide, for example, the name and location of the service station handling the call and the estimated time of arrival, Whyte said.

Previously, it was necessary to fill out a new form for each call, hang up, and go to a file to match the new file form with the original. Then the operator had to call the motorist back with the updated information. Now, the operator can give an immediate indication of the status of the call without having to get up and look for the information, the director said.

The system has a supervisory function that can display the call volume already assigned to any service station and reassign future calls from that area to stations nearby that are not as busy. That feature reduces a motorist's waiting time, Whyte said.

The AAA can also order a variety of reports from the system that would have taxed the administration of the manual system.

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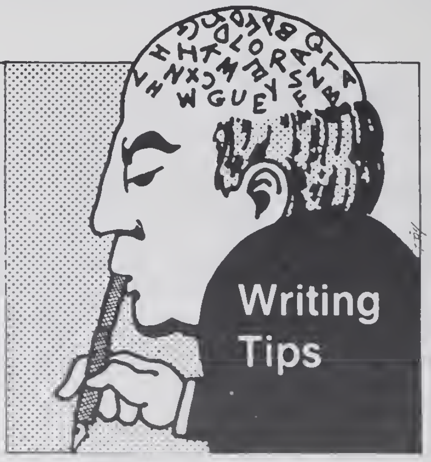


Nothing is more likely to offend a writer than seeing the editorial comment "wrong word." While word choice seems to be primarily a matter of personal style, there are, nevertheless, guidelines for helping writers use the right word in the right place — le mot juste.

This is the tenth in a series of articles on better writing.

First, there are mistakes resulting from the physical properties of words.

- Ignoring the sounds of words:

Example 1: Sentences with an abundance of "s" sounds seem unpleasant.

- Using the wrong word ending (wrong part of speech):

Example 2: The programmer put the items into the wrong sequence. (Does the writer mean "sequence" — order — or "sequencer" — sorter?)

Since words have both denotations (dictionary meanings) and connotations (extended or associated meanings), it is easy to make mistakes in meaning. Note the different meanings of "programmed":

Example 3: John programmed his home computer to do his income tax. (Denotation)

Example 4: The gang member was programmed to obey orders without asking any questions. (Negative connotation)

- Ignoring denotations of words:

Example 5: She wanted to study biofeedback to learn about the similarities between computers and the human brain. (Does she wish to study "cybernetics" instead?)

- Ignoring the connotations of words:

Example 6: I want you to redo your article. (Wouldn't most people prefer to "revise" rather than to "redo" their work?)

- Ignoring the etymology of words:

Example 7: They didn't realize that they were using a false pseudo random number sequence. ("False" is redundant.)

Example 8: They couldn't think of any rational reason for getting additional memory at this time. (Both words ultimately come from the Latin "reri," to think; therefore, only "reason" should be used.)

- Making mistakes in idiom.

Another type of error results from mistakes in idiom. People sometimes have difficulty with idiomatic expressions in their own language.

For example, what prepositions do "compare" and "revert" take? From an unabridged dictionary, careful writers learn that "compare" takes "with" and "revert" takes "to".

Some people have a tendency to use overly ornamental words and phrases. However, purple prose (or ornate language) repels many readers. Both flowery adjectives such as "glorious" and "beautiful" and pompous words such as "comprise" and "peruse" detract from the message.

- Using overly ornamental language:

Example 9: In the hushed atmosphere of the computer room, sleek young priests minister to the waiting deity, the computer. (Omit this sentence altogether.)

In fact, using strong nouns and verbs in preferable to using descriptive adjectives and adverbs.

Example 10: He walked down the halls very casually, and one couldn't tell that his project was due the next day.
Remedy: From the way he sauntered down the hall, one couldn't tell that his project was due the next day.

A related problem is using a general or vague term instead of a concrete or specific term.

- Mistakes from using vague words:

Example 11: The computer went down because of a malfunction.
Remedy: The computer went down because the memory failed.

However, in their efforts to be specific, some writers overuse similes and metaphors (figurative language).

- Mistakes using figurative language:

Example 12: The new programmer was as articulate as a clergyman, but as socially awkward as a country cousin.
Remedy: The new programmer was articulate but gauche. (The imagery in the original is too excessive for technical writing.)

Occasionally, sentences are unclear because a word is ambiguous in a particular context.

- Ambiguity resulting from context:

Example 13: Two more modern problem-solving devices are the calculator and the home computer. (Emphasis is on "additional," not "modern," which is implicit.)

- Finally, there are diction problems which occur because writers mix informal with formal words. One way of classifying American English is to divide it into four categories: slang, colloquial, informal language and formal language.

Slang and colloquial expressions are seldom appropriate in scientific or business writing. *Computerworld* readers should probably use diction which is between formal and informal on the language continuum.

- Using wrong level of diction:

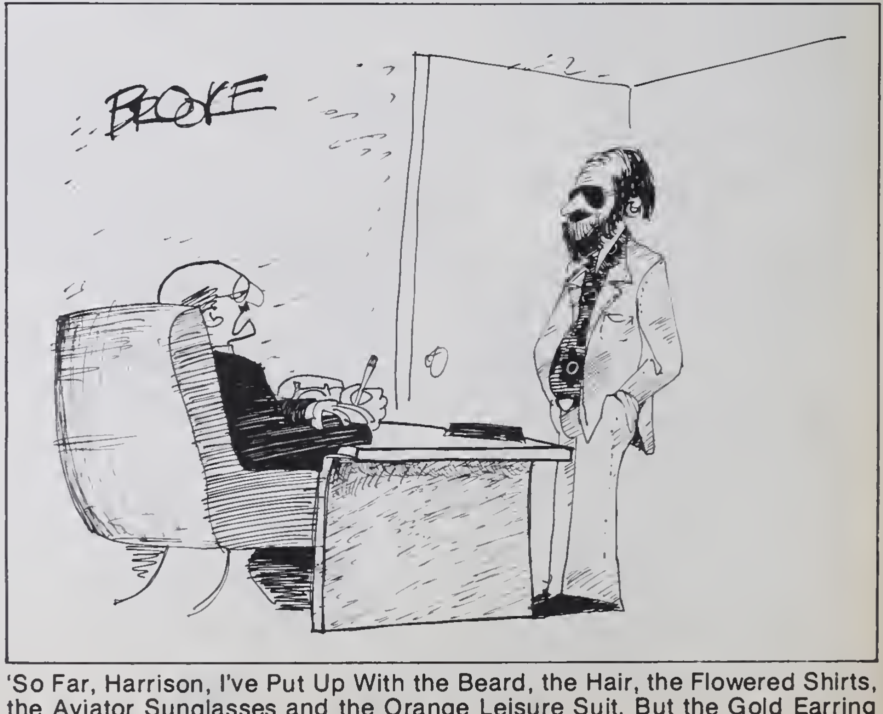
Example 14: Since I was in the computer room when the alarm sounded yesterday, I called the pigs. "Pigs," a very derogatory expression for "police," does not belong in a written report.)

Thus, writers should define a purpose and then choose a tone and a level of diction which is both suitable and consistent.

In summary, writers putting the finishing touches on their articles should ascertain whether they have used the right word in the right place. Have they avoided a succession of similar sounds? Have they used the right form of the word? Have they avoided ambiguity? Have they considered both a word's denotation and its connotation?

Furthermore, have they avoided far-fetched metaphors and overly ornamental language?

Finally, writers should consider whether they have consistently used words having the right degree of formality.



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To Offer Advice, Assistance

Software Conversion Center to Start Soon

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Federal Conversion Support Center (FCSC), planned as the primary source for software conversion technology within the federal government, is expected to be in business with a first-year staff of 16 people within 60 to 90 days, its acting director, Donald Page, said here recently.

The conversion center was transferred, along with the Federal Compiler Testing Center, from the Department of the Navy to the General Services Administration (GSA) early this year. Until now, however, it has been little more than a paper organization [CW, Jan. 15].

The two centers and the Federal Software Exchange Program are part of a newly established Software Development Office under GSA's Automated Data and Telecommunications Service (ADTS).

During its first year, the conversion support center will operate on a budget of $300,000 to $400,000 and perform approximately 20 software conversion projects, Page said. ADTS does not envision the center staff ever exceeding about 30 persons performing some 50 conversion projects a year.

Advisory Organization

Some grumblings have been heard in the federal DP community that the center's small staff and budget would preclude its ever offering significant assistance to agencies faced with complicated and expensive conversions tasks. Page noted, however, that the center is to be primarily an advisory organization.

"We do not expect it to get very large," he said. "The way we're looking at it is [that] this is not going to be a staff that does any great number of conversion. It will provide advice and assistance to other agencies. We envision, as far as the conversions themselves go, that most of the conversion work — the dog work of converting from one system to another — will be handled by contractors."

The staff will include technical assistance personnel to aid agencies in planning and carrying out conversion projects and contract assistance personnel to help agencies obtain conversion services from outside contractors.

The center will also have two contracting officers who will perform entire conversion procurement projects for agencies or departments that do not have the necessary procurement expertise. FCSC services will be performed on a reimbursable basis, with agencies repaying it according to fixed rates.

The software conversion center was established because it has long been thought that the government was spending too much and getting too little for software conversion, Page said.

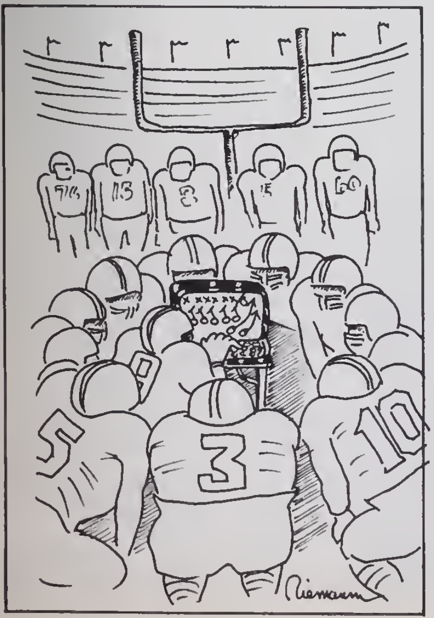
Besides GSA, the Office of Management and Budget, the General Accounting Office and Congress have all expressed concern about the rising cost of software conversion and the lack of centralized support for agencies undertaking such projects.

Planned Services

To prevent agencies from becoming locked into a single vendor's hardware, the FCSC will offer services such as conversion feasibility studies; review and evaluation of conversion studies submitted by agencies; planning, development, review and evaluation of conversion requirements; technical and contractual assistance and advise; procurement of conversion studies; and contract administration according to its recently issued guidelines.

All federal agencies will be required to submit for FCSC evaluation a conversion study, produced on its own, by an outside contractor or with the aid of the conversion center for any procurements in which:

- The estimated purchase price of hardware and software exceeds $2.5 million, excluding maintenance and support.
- The estimated system life cost for DP or telecommunications services is more than $2.5 million.
- The estimated conversion costs exceed $500,000.
- The source code to be converted exceeds 300,000 lines.
- The cost of conversion is to be the primary justification for a sole-source procurement exceeding $300,000.



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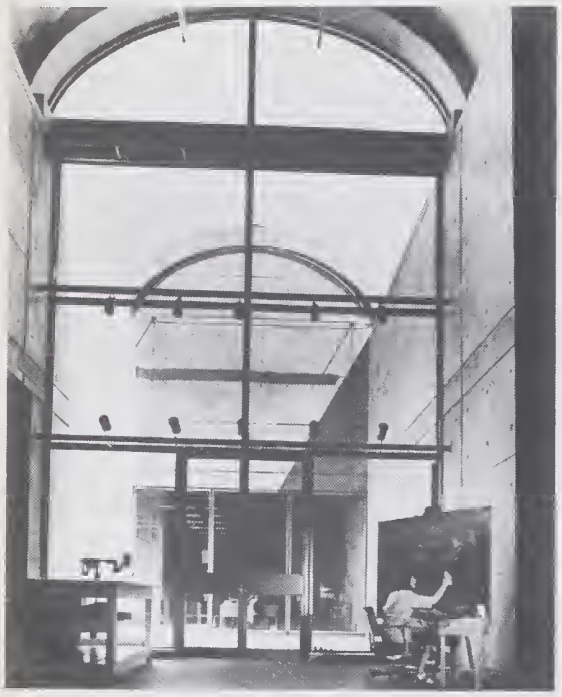

A conservator at the Kimbell Art Museum applies a treatment to a painting that has suffered from uncontrolled humidity and temperature through the years. Kimbell's computer-controlled system is said to reduce this kind of damage.

FORT WORTH, Texas — A computer at the Kimbell Art Museum here is protecting precious works against the ravages of temperature and humidity change while, at the same time, reducing the cost of electricity.

A 64K-byte IBM Series/1 minicomputer keeps the 120,000-square-foot complex at a constant 50% humidity and at a steady 70 degrees, a critical combination for preserving the canvases and the oils painted on them, according to museum spokeswoman Shirley Spieckerman.

The minicomputer not only protects art and artifacts by Rubens, Goya and others, but has reduced the electrical bills in the building, which employs as an architectual theme a series of self-supporting cycloidal vaults of post-tensioned concrete.

In its first month of operation, January of this year, the "rough-tuned" environmental control system saved almost $1,700, with $1,400 saved in February, according to building supervisor E.B. Brown. Monthly bills had been averaging between $7,000 and $8,000, he said.

The system is controlled by relays located throughout the building, whose output is fed into Kimbell's own interface to the mini. A large disk records and monitors attendance at the museum, and will soon be able to automatically adjust air flow through the building depending on the number of people in it.

Kimbell expects the IBM system to pay for itself in 18 months.

Catalog Lists Books on DP In Five Areas

INDIANAPOLIS — A free catalog listing books published in five DP-related areas is available from Howard W. Sams & Co., Inc.

Categorized under "Basics," "Programming," "Computer Technology," "Reference" and "Computer-Related," the books listed are aimed at audiences ranging from the home hobbyist to the technically oriented professional, the publisher said.

Under "Basics" are included such titles as *Microcomputer Primer, Your Own Computer* and *How to Buy and Use Minicomputers and Microcomputers.*

How to Program Microcomputers and *6502 Software Design* are included in the programming section. Thirty-two titles, ranging from *Microcomputers for Business Applications* to *TRS-80 Interfacing,* are in the computer technology category.

Copies of the catalog are available from Robert W. Soel, Advertising Coordinator, Howard W. Sams & Co., Inc., 4300 W. 62 St., Indianapolis, Ind. 46206.

Course to Cover Manager Skills

STAMFORD, Conn. — A two-day workshop presenting effective management techniques for systems projects and systems departments will be held here Dec. 11-12 by Robert H. Schaffer & Associates.

Created for systems managers who want pointers in working with users and potential users, the workshop was designed to help managers build good working relationships with users and shape projects to yield optimum results for users.

Costing $400 for each attendee, the workshop is limited to 15 participants who hold significant systems project responsibilities and have considerable contact with user managers.

Robert H. Schaffer & Associates is located at 401 Rockrimmon Road, Stamford, Conn. 06903.

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Offers Two Advantages

D.C. Automates Ticket Tracking

By Jay Woodruff
CW Staff

WASHINGTON, D.C. — The District of Columbia's Department of Transportation last month implemented a computer-aided ticketing system to better handle the estimated 2.5 million traffic tickets handed out here annually.

The move to a computerized ticketing system has two advantages for the district, according to Harry Gray, the acting chief of the district's Department of Transportation.

First, because moving and parking violations have largely been decriminalized here, the onus of administering the collection of fines for tickets has been moved from the D.C. court system to the department. The district will be better able to cope with the massive paperwork its ticketing operation generates by using the computer to keep records in order, to review the status of tickets periodically, update them and track them through any court proceedings.

Second, in January the department will be able to combine the computerized ticketing system with its on-line motor vehicle registration and licensing operation, which is being rewritten for implementation in conjunction with the traffic ticket applications.

"In the past, we've held up reregistration of vehicles if they had outstanding tickets against them, but it was a once-a-year process. Now, after the first of the year, it will be a year-round process where we can catch someone who has not paid tickets off before renewing a license or registering a car," Gray said.

Protection From Mix-Ups

Both applications are presently being run separately on an IBM 370/158 and accessed through a pair of IBM 3270 CRT terminals and printers. Operators have the option of printing licenses (100,000 are granted each year), bills for unpaid tickets, car titles and registrations (275,000 a year) and any other department printing requirements on seven Courier Terminal Systems, Inc. printers.

The ticket-tracking system should protect D.C. drivers from some mix-ups that have occurred with the manual system. For instance, Gray said, a driver with four or more tickets sometimes finds his car immobilized by the "Denver boot."

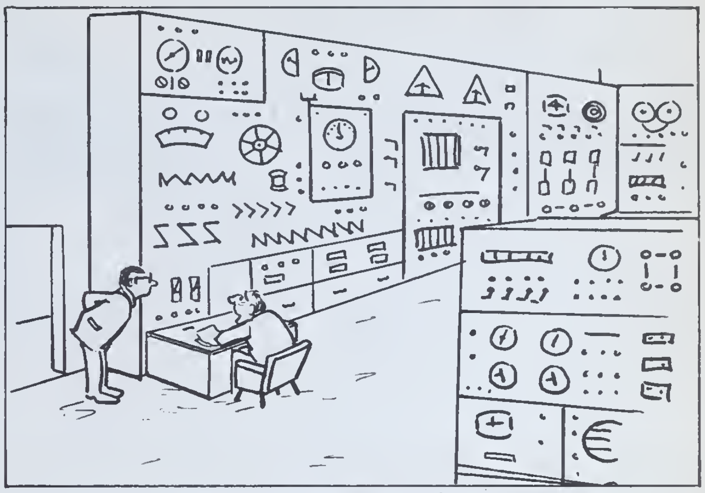
But even after the driver pays the fine and the clamp is removed, the boot may be applied again to the car because the paperwork does not catch up. "Once you've complied with the law, you shouldn't have to go through it again," the acting chief said.

Model for States

For now, the district is "one of the only places where you have the advantage of having vehicle registration and licensing as well as a ticketing operation in the same department."

The combined system could be used as a model by the states, in which ticketing operations are not closely related to the functions of the motor vehicle department.

Although the states are not centralized in the manner of the District of Columbia, Gray thinks a system like the one being installed here may someday be used nationwide through a computer system.



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EDITORIAL

Danger in Mid-Air

In calling repeated computer outages at the 20 Air Route Traffic Control Centers (ARTCC) around the country "a serious menace to the safety of air passengers and crews" [CW, Nov. 26], John Leyden, president of the Professional Air Traffic Controllers Organization, has called attention to a problem that could easily end in disaster if not dealt with immediately and decisively by the Federal Aviation Administration (FAA).

The FAA, meanwhile, continues to ignore or minimize such charges made by air traffic controllers, pilots and air traffic control (ATC) maintenance technicians alike and was charged last week in Congressional hearings with concealing information on outage frequency in an attempt to distort the truth concerning the system's reliability.

Even in the aftermath of a recent mid-air collision of two passenger jets following the breakdown and recovery of the ATC computer in Leesburg, Va. [CW, Nov. 12], the FAA insisted the nationwide system is "safe" and the outages "do not constitute an unsafe situation."

However, the FAA has acknowledged its concern over outages "that last more than a minute." In this respect, the FAA is way off the mark. According to controllers, it is not the length of a computer outage that constitutes a dangerous situation, but rather the mental transition controllers must make when switching from the computer-based, narrow-band radar system to its broadband backup. They say, in fact, one five-hour computer outage is less harmful than 10 successive five-minute outages.

Besides the unreliability of the existing equipment, Professional Airways Systems Specialists President Howard E. Johanssen last week decried the increasingly lax maintenance procedures for the equipment and cited the serious erosion of training programs for system specialists.

Since controllers, pilots and technicians are the people who work most closely with the equipment in question, it seems reasonable they would be most aware of the equipment's potential, both for success and failure.

When controllers, pilots and technicians all claim present IBM 360-based ATC computers are "obsolete" and maintain they are "more apprehensive than ever" about the potential for disaster, the FAA should listen. If the agency waits until a computer-related mid-air collision claims several hundred lives, it will have only itself to blame.

DATA PAST

Five Years Ago
Dec. 4, 1974

DP budgets were expected to rise an average of only 10.5% in 1975, according to a *Computerworld* survey. This rate approximately equaled the inflation rate. More than half of the limited user sample reported expected increases of less than 10%.

— — —

WASHINGTON, D.C. — Two separate privacy bills, one passed by the House of Representatives and the other by the Senate, were predicted to face an early death unless a conference committee could iron out the differences between them before the 93rd Congress went out of business. Both bills established procedures and safeguards for the collection and maintenance of manual and computerized files of personal information by the federal government and certain other parties.

Eight Years Ago
Dec. 1, 1971

NEW YORK — Less than 24 hours after Sperry Rand announced its Univac Division would buy the RCA Corp. customer base, Univac officials requested an immediate conference with the RCA Computer Users' Association (CUA). CUA president David Rau was "impressed" with Univac's willingness to work with the user group and also with its commitment to a smooth transition.

— — —

CINCINNATI — The November election results were delayed five days here because of programming problems, and a human observer, not a built-in audit check, averted a situation that could have been even worse. In the middle of the Cincinnati controversy over paper ballots, new criticism was aired on the punch-card system of computerized voting.

'Of course there'll be no comment! You want the Russkies to know we think they know we're a bunch of idiots? . . . I mean, to think we know they think we're a bunch of idiots? . . . I mean . . .'

LETTERS

A Blow for Capitalism

Victor J. Goldberg [Letters to the Editor, CW, Nov. 5] was right! IBM is frequently persecuted so unfairly, an act of which my own husband is guilty. Shame on him!

Recently, he formed a very small software corporation, mainly for profit, but partially out of sympathy for IMS users. As he hunted for office space, he came across an ideal location. Even the address was attractive — 51 Sugar Hollow Road, Danbury, Conn.

The negotiations with the owners were quickly and amicably settled. "But wait," said the landlord. "IBM has rented the ground floor and must approve all new tenants. It is engaged in very secret work and is moving from Southbury to enhance its secretiveness."

"Alas," said the omnipotent IBM, "this fledgling company, the Guild, Inc., cannot be a tenant in any building we occupy." Were they safebreakers? Were they the unknown competition feared by IBM? After all, the Guild does profess to write relational data base stuff, operating system stuff and all those things IBM does so very badly. Has the Guild penetrated the myth of the System/38?

And so the IBM bullies, fearful of the competitive capabilities of this tiny corporation, drove them from the building into the cold fall weather.

"Have no fear," I told my husband. "IBM has obviously been reading up on the story of David and Goliath, and the giant size of your staff's intelligence poses a distinct threat. Why you might even promote the virtues of one or another of the five dwarves at the expense of Snow Black."

And so, Mr. Goldberg, I read your letter with considerable interest, particularly your axiomatic association of merits and jurisprudence. You are right. And so is IBM.

Destroy festering intelligence before it becomes a threat. Otherwise it may become another lumbering giant to be destroyed by a virtuous David. You have struck a blow for capitalism. May you go down in history alongside Tammany Hall, the Ayatollah Khomeini and Genghis Khan.

Meredith Smith
Shelton, Conn.

File Design Not at Fault

While I am in fundamental agreement with the Taylor Report regarding the hazards of file design [CW, Nov. 19], I disagree with Taylor's identification of the problem.

The fault usually lies in data requirements specification, not file design. Data requirements specification is the joint responsibility of the systems analyst, user and file (data base) designer.

The analyst must obtain accurate and complete functional and data requirements through good interviewing and analytic techniques as well as knowledge of the application. The user must be willing to provide the information through active participation and a commitment to the development of a useful system. Finally, the file designer must ensure that the analyst obtains complete requirements (including appropriate value ranges of data elements, probability for change or expansion, the relationships between functions and data, and soon) and must interpret the requirements into a good file design.

Taylor's examples as well as a majority of other problem situations occur because of faulty data requirements specification rather than the file design itself.

Michael Lutz
Columbia, Md.

HUMAN CONNECTION/Jack Stone

Iranian DP Grinds to a Halt

While watching developments in the American-Iranian political situation on TV, I received a phone call from an Iranian DPer and former student of mine who had just arrived in America to live. When I last saw him, nearly three years ago, he was optimistic about a long-term career in DP in Iran to help his nation move into the 20th century.

But, according to my friend, the revolutionary government — and I use the term loosely — thought it best to drag Iran back 1,400 years. That meant pulling the plug on the computer subculture, which it fairly judged to be anachronistic to their concept of how Iranian society in 579 A.D. should be relived.

Here's what my former student had to say about the recent history of his computer center operation:

"We had been building our systems expertise to support police applications ever since we had access to machines in the early '70s. Naturally, we started with elementary 'batch-oriented' administrative applications and gradually built up our knowledge to the point where we were operating two rather sophisticated systems. One was a comprehensive personnel/-payroll application and the other was devoted to our employee savings plan.

"About five years ago, the management had become very concerned about the rising level of auto thefts in the major cities. In Tehran alone, we had 75 thefts on a typical day.

"The managers felt one way to help control this was to get the investigating police officer to the scene as quickly as possible. The average response time was about 12 minutes and they wanted a system that would cut it to about three. Another way was to use a high-speed communications network to distribute stolen car notices to all the major cities in the country.

"So we decided to undertake a long-range development program for a system with this goal in mind. Of course, once the system was in place, it could be used for other applications, such as notices for 'wanted' persons.

"Because of the large number of computer projects that were being requested by various government organizations, in 1976 the government established a central systems development department. Not only was this department tasked to coordinate development projects and arrange for competitive contracts, but it had complete responsiblity for software development, installation, training and hardware/software maintenance.

"The department was managed by Iranian nationals but, because it didn't have enough manpower to handle the heavy work load, it hired Americans to supplement the in-house personnel. Starting in 1979, the department had a staff of perhaps a thousand, of whom about 60% were Americans.

"We Iranians acted as end users for the new system and worked closely with the systems department and American subcontractors on the preliminary systems study phase. By the first of this year, we had completed this phase and the documentation was delivered. We had ordered a minicomputer for some initial development work and the site was ready.

"Then came the revolution, the new government and the directive to stop the computer projects. And that's what we did. I believe that all other development projects were terminated.

"Nearly all the Americans in the systems department were let go. About two-thirds of our staff — highly trained programmers, analysts and operators — were reassigned to jobs that had nothing to do with computer systems, and others are waiting to be reassigned as well.

"Our machine is practically idle now, just running the payroll and savings applications once in a while. Fortunately, Iranian technicians have been trained to maintain it.

"An opportunity presented itself to emigrate to America and leave the anarchy that was once my country. I decided to go first and make arrangements to bring my wife and children as soon as I can. I'm leaving the rest of my family, my friends and my possessions behind me, and I am very sad about it.

"But, as millions of immigrants who preceded me to America from other countries have found out, the United States of America is the one remaining refuge in the world today which offers a commodity far more important than all the oil in the Middle East, and that is freedom from tyranny."

READER COMMENTARY/J. Daniel Couger

Acpa Members Rate Jobs High in Motivation

Do professional society members view their jobs differently from the way the average analyst or programmer does? They do in at least one professional society — the Association of Computer Programmers and Analysts (Acpa). Results of our recent survey of Acpa members reveal differences from the national norm in three important areas:

1) Acpa members perceive their jobs to contain a higher degree of the key components for motivation.

2) Acpa members participate more in goal setting.

3) Acpa members' need for social interaction is lower.

My colleague Robert A. Zawacki and I developed national norms through studies that began in 1978. Seven industries represented by more than 30 firms geographically dispersed through the U.S., were included in the survey.

The job diagnostic survey for data processing (JDS/DP) was used as the survey instrument. It is completed anonymously in approximately 30 minutes. Our national data base now contains information on more than 1,000 analysts and programmers.

The principal thrust of the survey was to identify the key factors in motivation of computer personnel. Data was collected on 45 variables to determine the ones most influential in employee motivation. The results were published last year in three issues of *Datamation* (September and November 1978 and March 1979).

When I was asked last spring to present the keynote address at Acpa's national conference, held Oct. 22-24 in Washington, D.C., I agreed — with the stipulation that I could conduct the JDS/DP for Acpa's membership.

CORE JOB DIMENSIONS	NATIONAL NORM	ACPA
SKILL VARIETY	5.45	5.77
TASK IDENTITY	5.31	5.79
TASK SIGNIFICANCE	5.66	5.81
AUTONOMY	5.48	5.74
FEEDBACK FROM JOB	5.10	5.30

Figure 1. Ratings, on a scale of seven, of Acpa members vs. the national norm for programmer/analysts.

Our research extends the theories of motivation that originated with the work of Frederick Herzberg in the late 1950s. This branch of behavioral science has concentrated on demonstrating that the primary determinants of employee satisfaction and motivation are factors intrinsic to the work itself: recognition, achievement, responsibility, advancement, personal growth in competence.

The extent to which the job motivates depends on the degree to which each of the following five core job dimensions are present:

1) *Skill Variety*. Does the job require a variety of different activities that involve the use of a number of different skills and talents of the person?

2) *Task Identity*. Does the job require completion of a "whole" and identifiable piece of work — i.e., doing a job from beginning to end with a visible outcome?

3) *Task Significance*. Does the job have a substantial impact on the lives or work of other people — whether in the immediate organization or in the external environment?

4) *Autonomy*. Does the job provide substantial freedom, independence and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out?

5) *Feedback*. Do the work activities required by the job result in the individual obtaining direct and clear information about the effectiveness of his performance?

Figure 1 compares the responses of Acpa members with the national norm on the core job dimensions. Acpa ratings are significantly higher in four of the five categories. Only in the core job dimension "task significance" are the differences statistically insignificant.

The national norms shown in Figure 1 are for programmer/analysts (P/A) because the majority of Acpa members are in that job category. We also developed national norms for two other job categories in the system development area: analysts and programmers.

High Growth Need

Survey results indicate that programmer/analysts have a much greater need for growth than do other professionals such as engineers and accountants. On a scale of seven, the national norm for programmer/analysts was 6.02, among Acpa members the figure was 6.27 and among other professionals the norm was 5.59. (The data on other professionals comes from a data base of 6,000 persons, developed by Professors Greg Oldham of the University of Illinois and Richard Hackman of Yale University, using the same survey approach.

Growth need is defined as the need for personal accomplishment, for learning and developing beyond where you are now.

Stated another way, persons who stay in our profession are ones who are willing to work in a high-technology environment where one's skills become obsolete without continual updating.

Motivating Potential

Figure 2 compares the motivating potential (MP) of the job to the growth need (GN) of the individual. The data shows ratings of Acpa members higher in both categories.

The motivating potential of a job is derived from measurement of other survey variables and is a 3-digit figure.

(Continued on Page 32)

Acpa Members Differ From Norm in Job View

(Continued from Page 31)

An MP score between 150 and 200 is quite high.

The objective is a match between growth need of the individual and the job's ability ot motivate. The average scores for programmer/analysts, in both the national norm and Acpa, indicate that a good match occurs. The very high growth need of P/A's is matched with a job with a very high motivating potential.

In this category, working with averages is misleading, however. Use of the JDS/DP in individual companies sometimes reveals a mismatch between the growth needs of individuals and the motivating potential of their jobs. In this case, jobs can be redesigned to improve motivation characteristics.

For example, in one of the companies where the JDS/DP was administered, the job's MP was only 125, compared with average GN of 6.35 of the employees. Job redesign brought the MP up to a level consistent with the high growth need of the employees in a short span of time.

Both the national and Acpa surveys revealed feedback problems for programmer/analysts.

Fortunately, this is a problem where improvement can be obtained rather quickly. In companies where the JDS/DP revealed this problem, training courses for supervision improved feedback significantly.

On the other hand, feedback problems may be inherent in the computer field — requiring continuous emphasis. The survey results on the need for social interaction, discussed next, indicate such a situation.

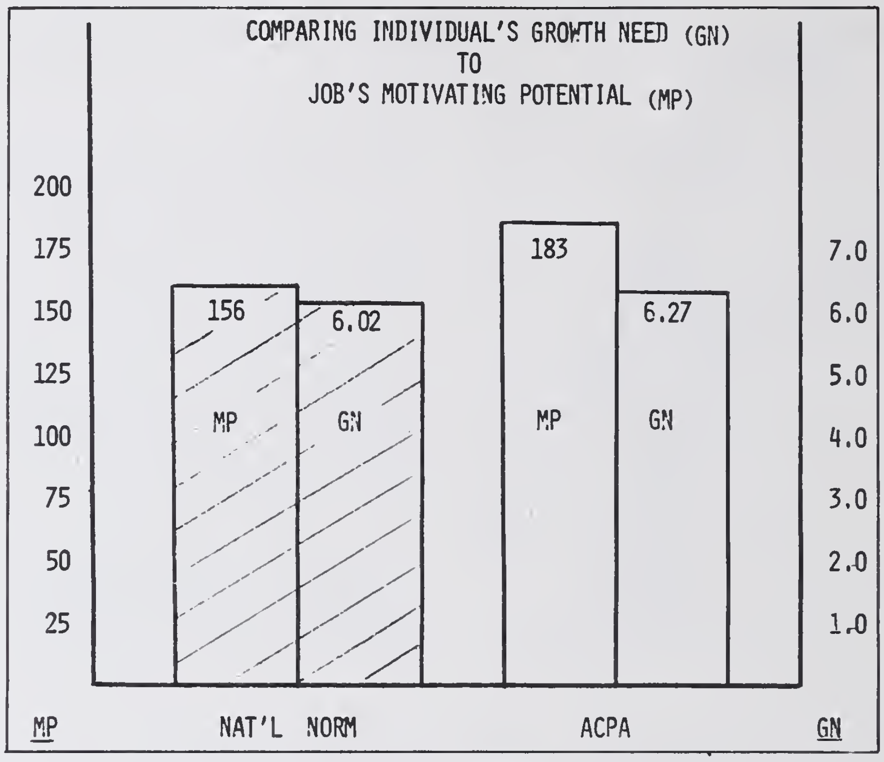

Figure 2. The average programmer/analyst's need for growth is matched by a job that has the necessary ingredients for motivation.

Low Social Need

The JDS/DP revealed a low need for social interaction among computer personnel, compared with other professionals. The rating is 4.25 for the average programmer/analyst in the national norm. It is even lower (4.04) for the average Acpa member.

Low social need would not interfere with the effectiveness of a person in a rather cloistered job, such as a system software developer. It is a serious problem for persons who have frequent interface with other persons in the performance of their jobs.

Low need for social interaction may also be a prime cause for the feedback problem. Analysts and programmers who are promoted to supervisory positions do not automatically discard their low social need.

Communications skills can be acquired, however. For persons to whom such skills do not come naturally, formal training programs can improve communication capabilities. DP departments have long recognized the need for technical training. Equal emphasis needs to be placed on training in the behavioral and communications areas, for system personnel and for supervisors.

Reasonable Conclusion

A study of only one of the several professional societies representing programmers and analysts does not justify generalized conclusions. All that is reasonable to say at this point is that views of members of one society, Acpa, are significantly different from the national norm.

We are in the process of conducting the JDS/DP in several other professional societies in order to make a broader assessment.

However, results from all our research to date make it clear that special characteristics of computer personnel necessitate management approaches that differ from those used for other employees in the company.

Couger is professor of computer and management science at the University of Colorado.

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THE TAYLOR REPORT/Alan Taylor

Cobol Standard Should Stand Popularity Test

Cobol is here to stay, according to Daniel D. McCracken, current president of the Association for Computing Machinery (ACM). However, the danger of unpopular additions to the standard with only narrow technical support may leave the official language around, but no longer as the business-oriented system it is meant to be. The language may well be diluted until it is just another system, and while this outcome is not totally unavoidable, it seems to be the most likely result of the current technically oriented standards committee's actions.

Cobol was not always hospitable to unproved additions to the language. In the early, pre-ANS-standard days, additions were made very cautiously and only after a number of vendors had successfully tried them out. Success was judged in two independent ways — whether the language worked as its businessman's English wording indicated and also whether users liked the addition sufficiently to make it a ''popular'' feature.

The same dual testing really applied in the first (1968) standard, when report writing was added to the language. It was already working, the terms were in business English and the system was in popular use where available. However, in the second standard, 1974, the test of popularity was dropped and the theoretical, unproved communications system was added. As far as standard usage, communications has been a failure and one which could have been avoided if the original tests of popularity had still been in operation.

The next and third standard, currently expected in 1981, appears to have at least two areas which would not currently qualify under either the broad-based popularity test or the business English test. First are the special facilities for structured Cobol which effectively duplicate the current processing facilities and the second is the addition of Boolean logic, which has no place in normal business processing but appears to be aimed at compiler writing.

Structured Cobol Standard?

The problem with the structured approach is not that structured programming has divided the programming world (which it has), but rather that structured programming requires artificial constraints on when certain procedures should be defined. From this springs both a lack of business-English feeling and also the ability to forecast what is coming. This ability to forecast permits vital meanings to be implied (by periods that carry no such implied meaning in English).

Both these facets of the structured concepts that are being brought into 1981 Cobol make the language less understandable and more error-prone. Jargon — particularly jargon that belongs to only one group within a profession — is the exact type of danger that Cobol standards were intended to keep away from us. Now, by the precedent of structure, the door has been opened for Cobol to become jargonized by structure and, in the future, by other philosophies.

The Boolean logic additions can also be seen to have a narrow function for some, including in particular the hardware vendors who dominate the Cobol committees to the exclusion of the plain businessmen who are the official beneficiaries of the language. With an adequate Boolean system, it is possible to achieve that old dream: a Cobol compiler written in transportable Cobol.

Such a bootstrap system would permit the quick transfer of compilers, and their compiled programs, from one set of hardware to another. Again, this is a very laudable venture, but neither popularly tested nor business-processing oriented.

The argument that these expansions can only be good and that people or installations who don't want to bother with the new facilities can leave them alone is really fallacious, unless it is assumed that all 1981-standard users will also use precompilers to screen out any use of the facilities.

Precompilers have been with us for a decade, and while useful, they are not now, nor will they soon become, standard installation equipment. Without these, the maintenance programmer (if not the original programmer) must be trained in all aspects of the language in case they are used.

The original programmer is always tempted to try the new facilities, and they will unavoidably creep in, making Cobol just another oversized, general-purpose language with individual programmer styles, rather than the standard, governing the cost of upkeep.

By then, Cobol will be just another PL/I situation.

The way out of these problems is to keep untried and nonbusiness areas out of the standard until trial and popularity *with business-oriented users of Cobol* qualify them for the standard.

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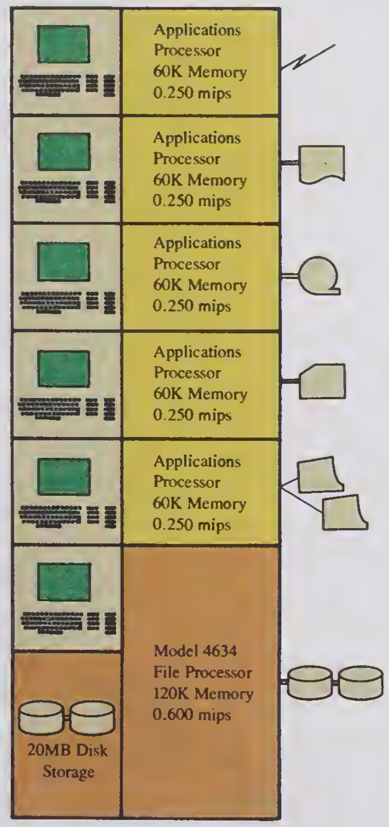

ARCPAC. 420K memory, 20MB disk memory illustrated here. Each applications processor is multilanguage, multifunction.

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Despite Debate on Motorgenerator's Virtues . . .

READER COMMENTARY/ Ken Brill

I have been pleased by the favorable response to my Aug. 20 article "Pulling the Plug on Dirty Power" (mostly from end users) and disappointed by the criticisms voiced by vendors of competing technologies.

Given the complexity and comprehensiveness of the article, there are obviously some things I now wish I had said differently and a few points I inadvertently omitted. Debate on the finer points could go on for years. However, my conclusion still stands — for many sites a motorgenerator is the most comprehensive and cost-effective solution to eliminating poor quality power.

The computer power industry is still in its infancy and in some cases it is quite possible for two competent people to look at the same data and reach different judgments. I would hope that rather than attack character or integrity, it would be more appropriate if we could just agree to disagree. We are working in a rapidly deteriorating power environment without the benefit of a common, accepted terminology.

The IBM study quoted in my article is admittedly out of date, but it is the only hard data available in the public domain. Bell Laboratories has done a more recent power study, but the results will probably never be published. All of us will continue to flounder somewhat until more current hard data becomes available. In the meantime, however, we can only do the best with what we know now.

Wrong Information

John Waterman's letter was printed as a general rebuttal to my comments concerning isolation transformers [CW, Oct. 8]. In each case regarding transient elimination, response time to load changes, equipment costs and certain trends by large mainframe manufacturers, Waterman presented incorrect or misleading information.

Waterman's first criticism was that a high-grade isolation transformer can eliminate normal mode transients in the 200KHz area. That is correct. However, the normal mode transients I referred to (as measured by Allen and Segall) were in the 400- to 500Hz area, where an isolation transformer is of minimal benefit.

One point I should have explored was the inherent protection provided by the computer's own internal power supplies. These power supplies will filter out the majority of normal mode transients. However, with a typical computer consisting of tens to hundreds of independent power supplies, built to different specifications by different manufacturers, it is extremely difficult to characterize just how much internal protection is provided.

Even if the power supplies did provide 85% to 95% normal mode transient protection, between three and nine transients per month would squeeze through to cause problems. Many DP sites would find this an unacceptable level of protection.

Waterman's next point quoted the article out of context and argued my point that the motorgenerator provides the fastest possible voltage regulating response to changes in the input voltage. I based my claim on the fact that the output voltage of the motorgenerator is independent of the input. However, he was correct in saying that motorgenerators are somewhat slower in responding to load changes.

For this and a number of other reasons, it is important to emphasize that all motorgenerators are not the same. Significant and substantial differences exist between rotary manufacturers, and the article frankly stated that most of what is available is 20 years old in design approach and obsolete in terms of satisfying computer user needs. However, a modern, properly designed and installed unit will have no problem with the load changes that typically occur in the computer room.

Unfortunately, Waterman gave no source or documentation for the figures in his cost comparison. My cost data came directly from U.S. Navy end-user experience in buying millions of dollars worth of both uninterruptible power systems (UPS) and motorgenerators.

Waterman's inefficiency figures will not survive the scrutiny of a watt hour meter. Part of the Navy's standard acceptance tests measure actual efficiency. Lt. Thomas Key's report showed an efficiency of 83% for motorgenerator and 85% for a UPS (based on 100KVA class).

These measurements were taken several years ago and UPS have improved some since. However, motorgenerators have also improved — at least the equipment manufactured by Atlas Energy Systems has.

The only way Waterman could possibly have gotten his motorgenerator efficiency figures was to use a 20-year-old induction-motor-type unit. The article was very clear in stating the use of a synchronous motor! Again, it is important to point out that significant differences do exist among the different types of motorgenerators commonly available.

Many people don't really realize that while UPS systems may initially have an efficiency edge of 1% to 2% over motorgenerators, this advantage rapidly deteriorates with time as the effective resistance of the batteries rises due

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to aging. Within three to five years, the UPS efficiency will have dropped to that of a motorgenerator, and thereafter the motorgenerator will be more efficient. And these figures ignore the lifetime additional power cost of the air conditioning required by the UPS.

Posing as a customer, I was unable to get a full maintenance contract (including travel, parts and service) for the $4,000 figure quoted by Waterman. The prices I was quoted by three UPS vendors were all significantly higher or the cost did not include full coverage. I once again refer to the Navy's maintenance experience of $8,000 yearly for a UPS vs. $1,000 for a motorgenerator.

I was recently at the Washington Navy Yard and had a chance to review side-by-side installations of several motorgenerators and a UPS. The motorgenerators have operated continuously with no maintenance or downtime for more than six years.In contrast, and despite an investment of close to $1 million and an $80,000 yearly maintenance cost, the UPS has provided less than three months of continuous service in the last four years.

Maintenance With Age

Waterman's charge that rotary equipment requires increased maintenance with age does not reflect our own experience. Yes, bearings must be changed occasionally, but the Navy's six-year maintenance-free experience is not atypical. Atlas charges $2,500 to $3,000 for an on-site, one-day bearing change which, amortized over six years, comes to less than $500 a year.

One of the points not brought out in the article was the varying ability of a UPS and a properly designed motorgenerator to absorb transients and lightning. We recently had a motorgenerator protecting the Santa Barbara, Calif. data center for Sambo's Restaurants when the facility received a direct lightning strike. Twelve hours after the incident, the Atlas motorgenerator was up and running, allowing the computer to restart with no damage whatsoever.

Had the same incident occurred with a UPS installation, most of the inverter section would have been destroyed and more than likely some of the lightning charge would have entered the computer, causing potentially severe and costly damage. Moreover, it probably would have taken weeks or months to repair the UPS, and its reliability would be questionable for even longer.

As I noted in the article, the motorgenerator on a hardware-to-hardware basis runs 50% to 60% of the cost of a UPS. End users, however, don't care about hardware cost alone, but are more concerned about the total cost.

Waterman conveniently ignored these added costs which happen to be substantially less for the motorgenerator. An accurate comparison should include costs for hardware, sales tax and freight, plus estimates for engineering, site preparation, building modification, air conditioning, electrical installation, spare parts and training. The completed installation for a UPS can equal twice the cost of the raw hardware.

Key's calculations do not include a cost for heat removal, which Waterman rightly points out should be considered. However, contrary to Waterman's claim, motorgenerators do not require air conditioning and are often located in a boiler room or some other space where only outside air is used for cooling at no or minimal cost.

In contrast, a UPS system absolutely requires air conditioning. The following quotation is taken directly from the site planning guide of a major UPS manufacturer: "For maximum UPS reliability [Company X] recommends that the room temperature be maintained below 77°F. Most battery warranties are also dependent on an average ambient temperature of less than 77°F."

Waterman's UPS heat removal costs added to Key's published calculations only *improve* the cost advantage of motorgenerators over UPS.

While I have been sharply critical of Waterman's rebuttal, I am not anti-UPS because certain DP applications (airline reservation systems, for example) truly need uninterruptible power. The purpose of my article was to point out that a motorgenerator provides 99% of what the UPS can do for substantially less investment and less annual operating cost.

Finally, Waterman contested my statement that motorgenerators are the handsdown choice of major manufacturers for virtually all large computer systems. I thoroughly researched my claim and my statement still stands. In fact, several of the computer manufacturers mentioned will not allow a UPS to directly front-end the CPU without an intermediary motorgenerator to filter out problems that may get through or are created by the UPS.

Brill is president of Atlas Energy Systems in Cambridge, Mass.

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'Qubit' Eases Financial Work

COLUMBUS, Ohio — Qubit, a financial data base manangement system (DBMS), is available through the remote computing service facilities of Compuserve, Inc. It was designed for the complex and diverse needs of conglomerates, bank holding companies or any other organizations that must collect, analyze and report data for multiple divisions, branches or product lines, a spokesman said.

Although he described it as a hierarchical system, the spokesman added that with Qubit's data entry, retrieval and reporting system, there are no confining structures or predefined report formats. The user can design the data base to match the company structure and reporting needs.

In particular, the user decides how many reporting levels and how many components at each level are needed. It is also up to the user to define which accounts are income, average or weighted average balance sheet accounts, the spokesman continued.

Components can include actual, budget and forecast amounts for as many years as the user wishes. "And if you add a new branch or establish a new forecast, Qubit easily accommodates your changes," he claimed.

Library Access

In addition to the facilities that are built into Qubit, the user may also access other capabilities in the Compuserve library in order to extend work started under Qubit.

Qubit includes, for example, an interface with Facts, a financial analysis and tabulation system with English-like commands that can be used to automate financial modeling and management reporting.

With service available most heavily in the Midwest and East but with access points in California and Arizona, Compuserve is based at 5000 Arlington Circle Blvd., Columbus, Ohio, 43220.

Users Gain Postal Discounts With Outbound Mail Presorts

IBM-oriented data centers, with equipment large or small, may be able to save their organizations money on postage.

Financial Industry Consultants (FIC) in Birmingham, Ala., reported that its Zipsort package permits printing of customer correspondence in Zip Code sequence, enabling the user in a DOS/VS-Power/VS environment to take advantage of a 2 cent per item presort discount.

The Presort package, offered by Software Review Corp. from York, Pa., breaks outgoing mail generated on IBM System/32s or 34s into the Direct, City, Sectional Center Facilities and Residue categories specified by the U.S. Postal Service to qualify for the savings, according to a Software Review spokesman.

Presort also provides a density report to help the mail room bundle, tray and label the correspondence for improved delivery. Written in RPG, the package can be installed without any change to existing hardware or software, the spokesman said.

The vendor has Presort tailored to the differing postal requirements that apply to first, second, and third class mail. The first class version costs $650; second class, $750; and third class, $800, with source code for each available for $100 additional.

Software Review is at 33 E. Philadelphia St., York, Pa. 17401.

Meanwhile, the Zipsort software functions on the larger machines without requiring a sort of the report/correspondence data. Instead, each page of output is "tagged" based on user-defined reference and Zip Code data found on the page.

The post-application sorting is done on a five-digit field, which is normally but not necessarily Zip Code. Therefore some users have adapted the sorting to other purposes with good results, according to the vendor.

Output including some 7,000 pages will fit in 175 tracks of IBM 3330 disk space, the spokesman said.

Zipsort costs $200/mo and can be ordered from FIC at Suite 218, 244 Goodwin Crest Drive, Birmingham, Ala. 35209.

'Trax' Signals Overutilization

PRINCETON, N.J. — An extra-cost option now available from Applied Data Research, Inc. (ADR) enables users of the company's Look performance monitor to set thresholds and get warnings when use of specific system resources exceeds those thresholds.

Since the user decides which resources to monitor and what rates to consider critical, the alerts produced by the Trax option are tailored precisely to the user's needs, a spokesman noted.

Trax is able to monitor all major MVS resources including CPU utilization, paging activity, I/O rates, both RSM and ASM operation, enqueue conflicts, buffer shortages and "even TSO transactions," he said.

Trax warnings can be both displayed for immediate action and stored for later review. Intended currently for MVS and MVS/SE use, the option costs $3,800 for the first CPU and $2,600 for each subsequent one, ADR said from Center CN-8, Route 206, Princeton, N.J. 08540.

Graphics Displays Made Into Slides

SAN DIEGO — Full-color 35mm slides can be made from CRT displays with the help of software that converts the displays to magnetic tape and a service that uses the tape as input to a slide-making process.

That in a nutshell is the latest option available to users of the Disspla and Tell-a-Graf graphics packages from Integrated Software Systems Corp. (Issco). Both the screen-to-tape software and the tape-to-slide service also come from Issco, a spokesman said.

He was also quick to note that in previous updates, users had gained linkages to statistical systems — SAS from the SAS Institute, for example — so that they can combine significant data manipulation capabilities with the graphics support of the Issco packages.

At an estimated $10- to $18/slide, the reproduction work is not a low-cost operation, but the vendor argues that the slides, enabling a large group to see the results, could be well worth the cost.

Further details are available from Issco, 4186 Sorrento Valley Blvd., San Diego, Calif. 92121.

Manufacturing Support Grows

ANDOVER, Mass. — Described as the latest version of the vendor's family of net change manufacturing resource planning systems, Sigma 2000 — Software International Generalized Manufacturing Application — is a data base-oriented software system that operates in virtually any current IBM environment.

A closed-loop manufacturing system with strong costing capability, Sigma 2000 performs "true simulation, which substantially improves planning on a 'what-if' basis," according to a spokesman.

All major ingredients necessary for a manufacturing resource planning system are available in Sigma 2000, he claimed. These include materials requirements planning (MRP), shop floor control, capacity requirements planning, advanced cost, advanced purchasing, master production scheduling and on-line data entry/inquiry.

Sigma 2000 operates in DOS and OS environments, and apparently in the VS counterparts as well.

The package costs from $25,000 to $75,000 depending on the operating system and DBMS to be supported and the application options to be provided.

Software International is at One Elm Square, Andover, Mass. 01810.

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Software Seminars Set

PALO ALTO, Calif. — Two seminars, each addressing a different aspect of computer performance measurement or evaluation, will be presented by the Institute for Software Engineering during the next month.

"Software Physics and Capacity Management" will be conducted Dec. 10-14 by the institute's Louis Murphy at Del Webb's Town House in Phoenix. This course is an introduction to the theory of software physics, with an emphasis on its practical application to the functions of computer-related capacity management.

Upon completion of this course, attendees should be able to characterize work loads, express work load demands on computer equipment resources and express the reserve capacity of existing computer configurations.

The week before Christmas, David Morley will conduct a seminar on "Performance Reporting, Instrumentation and Work Load Forecasting" at the Hyatt Regency in New Orleans. In addition to defining the basic reports needed to comprehend installation performance, the course will look at forecasting for both costing and capacity planning purposes.

Each course is open to institute members for $435 or nonmembers for $650.

More information is available from the institute through P.O. Box 637, Palo Alto, Calif. 94302.

On-Line Documents Added To 'Apollo' JCL Support

CHERRY HILL, N.J. — Users with OS or OS/VS environments on IBM 360, 370 or compatible mainframes may have an easier time getting jobs into production with an enhanced version of the Apollo Job Launch Subsystem of Value Computing, Inc.'s Data Center Scheduling System (DCSS).

The basic DCSS produces schedules for the CPUs and other work centers — keypunch, output quality assurance and delivery, for example — that make up a data center. It can also be used to simulate new hardware configurations or to predict the impact of new applications or other work load changes, a spokesman noted.

Apollo is an extension of the system that allows on-line editing of JCL and automatic submission of the affected job to the proper CPU. The most important feature in Apollo Release 3.0 is one that will allow users to eliminate manual runbooks by putting documentation on-line, the spokesman said.

Text editing, full-screen editing under IBM's Time Sharing Option and global string manipulation facilities are all provided in the update so users can work in a variety of settings, the spokesman added.

Also added to Apollo is an ability to keep generations of JCL, program control cards and pertinent data for as many as 14 generations.

Apollo has also been enhanced to allow a class/priority matrix to be used to be sure jobs are being released by Apollo to the class and priority originally scheduled for them. Beyond that, a conversational mode has been added to ease the editing of data on partitioned data sets and on files controlled by The Librarian from Applied Data Research, Inc. or by Panvalet from Pansophic Systems, Inc.

The complete DCSS package including the updated Apollo and another subsystem — an on-line job tracking and schedule revision facility — costs $47,000 for non-VS sites and $53,000 for VS users.

Value Computing is at 300 VCI Building, W. Marlton Pike, Cherry Hill, N.J. 08002.

Cosmic Offers Pert Package

ATHENS, Ga. — The IBM 370-oriented version of the National Aeronautics and Space Administration (Nasa) Pert Time II package, now available from the Cosmic clearinghouse, was developed as an aid in the planning and control of time and materials allocated to and utilized during phases of a project development effort.

This package utilizes a modular technique, enabling the user to break up the project, which starts out conceptually as a single network of points in time and actions, into subnets and even smaller "fragnets."

Each fragnet will contain some events that are identical to events in other fragnets which make up the project network. These are defined as "interface events" and identify the relations between fragnets, a spokesman said.

Once all aspects of a project have been described in terms of fragnets, a control network is automatically generated, he added. This network is made up of control activities obtained by condensing all paths between control network events.

The program can handle 50 fragnets, each containing as many as 2,160 activities, 2,000 events and 500 starts, ends and interfaces. Written in Fortran IV and OS assembler, it requires 350K bytes of memory, is cataloged as program no. LEW-13145, costs $920 and is distributed on magnetic tape.

Documentation is separately priced at $15, Cosmic reported from Suite 112, Barrow Hall, University of Georgia, Athens, Ga. 30602.

December 1, 1979

To the users of OMSI Pascal-1 for the PDP-11:

We are pleased to make available to you the new version (V1.2) of OMSI Pascal-1. V1.2 contains many enhancements and improvements, and you will find it easier to operate and even more reliable. The following overview outlines the most significant changes incorporated in the new version. For details, please ask for the V1.2 Language Specification and User's Guide(s).

Extended precision real arithmetic: a compiler switch causes all real calculations to be carried out with 15 digit precision (standard PDP-11 double precision four-word format). Extended precision is supported on all PDP-11 and LSI-11 processors, and on all operating systems. The precision of the library functions is also extended.

Debugger: the interactive debugger is now entirely Pascal-oriented, and is conversant with all user identifiers, types, scope rules, and the source program. The debugger has the capability, for example, to intercept a fatal error and display the last executed statements, or to accept and store commands for display of variables at a breakpoint.

Profiler: if you have ever wondered where your program spends its time, the Profiler can produce a listing and show you the number of times every line is executed.

Fatal error recovery: the system error procedure can be replaced by a Pascal-coded routine.

Direct access files: the procedure Seek(file,record) is a built-in procedure, and causes the file buffer to be positioned to any desired record.

File options: many enhancements have been made in file processing, allowing (for example) large buffers and spanned records on RSTS and RT11, and RSX file attributes including variable-length records. The RSTS file support uses 24-bit block numbers for RSTS V7 large file capability. All systems now support a full default filename when opening files.

Fast MACRO: most of the compilation time is actually spent in MACRO and the linking loader. On RSTS systems, a new utility (MAC) performs both of these functions in one-third of the time.

String package: included with V1.2 is a set of procedures and functions for handling dynamic length character strings. The package is written for portability in Standard Pascal.

Order information: to OMSI Pascal-1 licensees in warranty or extended support, V1.2 is available for the cost of handling, media, and shipping; other parties please contact Anne Smith, Vice-president for Sales.

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Because IDMS is truly a data dictionary-driven system, any component you require – regardless of when you acquire it – is fully integrated with the DBMS via the data dictionary with great attendant efficiencies.

For example, a dictionary-driven teleprocessing system can be reconfigured dynamically without ever bringing the system down and disrupting operations.

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Database Management
IDMS is *the* state-of-the-art database management system for use in the IBM environment (including the new 4300 series). The basis for all Cullinane software components, IDMS is the first CODASYL-compatible DBMS and gives a high degree of hardware and programming language independence. The *only* DBMS named to the Datapro Honor Roll for three consecutive years, IDMS is one system you must know before you plan your future in DP.

Data Communications
IDMS-DC is the only data communications system designed specifically for use in the database environment. Fully integrated with IDMS, IDMS-DC therefore gives faster response time, more economical use of memory and greater simplicity of use than any other TP monitor can in a sophisticated multi-terminal configuration. IDMS-DC provides a powerful recovery facility, mapping support, storage protection and many more superior programmer productivity and data integrity features.

Data Dictionary
IDD is the only "active" data dictionary because it is fully integrated with a database system. It is a powerful design and control tool for use with IDMS and with the other Cullinane software components, yet it can be used as a stand-alone system to define and standardize *all* data resources whether manual or automated, database or conventional file systems. IDD supports FORTRAN, COBOL, PL/1 and Assembler.

Report Generator
CULPRIT can be used to produce even the most complex reports quickly, easily and with a bare minimum of coding. It can access virtually any file structure including conventional files or databases. CULPRIT is economical. It can produce up to 100 reports with a single pass. CULPRIT can be used as a powerful stand-alone or as part of a fully integrated database management system from Cullinane.

OnLine Query
OnLine Query, Release 2.0, is a major new advance in interactive information retrieval systems. Fully integrated with IDMS, it requires no programming in order to be immediately useful upon installation. OnLine Query provides managers and user departments with a powerful, easy-to-use set of English commands that allow instant access to selected information stored in the database. Multiple Record Retrieval, QFILE storage and DBKEYLIST command are only a few of the system's advanced features.

OnLine Program Development
INTERACT is an online system for program development, remote job processing, text editing and word processing. INTERACT is *the* programmer productivity system. It offers a powerful command repertoire, fast terminal response time, and economical CPU requirements. INTERACT is backed by Cullinane's responsive worldwide network of technical support centers.

Distributed Database
Cullinane's Distributed Database System allows multiple IBM computers to share a common IDMS database. Distributed database is a unique Cullinane capability. For the first time you can support applications programs at remote sites and allow them to access a central database with complete user transparency and full data integrity. Cullinane Distributed Database is the system of the future – available today.

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'Rims/MPG' Said to Ease Use of Datasystems

MONROEVILLE, Pa. — Running on Digital Equipment Corp. Datasystem hardware, the Requestor Information Management System/-Mechanized Program Generator (Rims/MPG) package from Information and Systems Research, Inc. is intended to help nonprogrammers produce reports on demand.

The package consists of three modules controlled by a "front-end" dictionary facility, which allows the user to name data elements required by an application and to define file protocols, data types, lengths, formats, acceptable value ranges and other parameters.

The other modules use the dictionary entries to build Dibol or Basic-Plus programs, depending on which Datasystem and operating environment is in place. The "Screens" module, for example, writes procedures for entering, changing, inquiring against and deleting records from master files.

The "Merge" module provides three basic functions: the writing of programs to extract information from the dictionary, the performance of arithmetic and logical operations on the data elements and the storing of results in new or existing dictionaries, a spokesman said.

The third of Rims/MPG's modules, "Reports," writes programs to print the selected data elements in user-defined formats.

Rims/MPG functions in Dibol on DEC Datasystems using either CTS-300 or CTS-500 operating systems and in Basic or Basic-Plus on systems under RSTS/E. Programs developed under the software are compatible with files generated by programs produced by California-based Mini Computer Business Applications, Inc., by DEC's Isam or by the RSTS/E-supported RMS-11K.

Distributed on RL01 or RK05 media, the package costs $750. There is a $150 surcharge for RK06 media, the spokesman noted from Suite 205 in the Jonnet Building, 4099 William Penn Highway, Monroeville, Pa. 15146.

Series/1 Drives Business Operations

BRIARCLIFF MANOR, N.Y. — Although the Distributor System 1.0 was developed by The Systems Guild, Inc. as an integrated business system for use with IBM's Series/1 minicomputer, the seven modules can be acquired and used separately.

The application areas covered by the modules include customer and product master management with customer mailing labels; merchandise receiving, physical inventory maintenance and inventory control reports; and daily order entry, maintenance and posting to the open order file.

The modules also support open order management; shipping and back orders; invoicing; and cash applications to accounts receivable, account inquiry, aged trial balance reports and account statements, a spokesman said.

Designed to work under IBM's Event Driven Executive (EDX), the Distributor System enables operators to scroll data as needed, to move back and forth between screens and to maintain data without loss of other information on a file. Error correction features are "exceptionally smooth," he added.

Data entry operations can be stopped at any point without loss of file integrity, the spokesman said, adding that, once entered, information in all files is available for immediate access through predesigned screen displays.

An integrated information flow requires that all data be entered only once, after which it will be carried throughout the system.

The software requires a 64K Series/1 with disk, diskette, printer and one 4979/78 CRT console. Each module costs $500, but there is a discount plan available to software OEMs ordering multiple copies of any particular module.

More information is available from The Systems Guild, Inc., 91 N. State Road, Briarcliff Manor, N.Y. 10510.

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SDC Still Offering Data Bases

SANTA MONICA, Calif. — Five data bases developed and maintained by London-based Derwent Publications Ltd. will continue to be accessible through the Orbit information retrieval system supported by System Development Corp. (SDC), under terms of an agreement recently signed by Derwent and SDC.

The largest of the Derwent data bases is the World Patent Index file, which contains 1.6 million documents related to patent specifications issued by the patenting authorities in the major industrial nations.

Other data bases provide references to literature on agricultural chemicals, pharmaceuticals, veterinary medicine and new developments in synthetic organic chemistry, a spokeswoman said.

Access to the data bases is through a conventional terminal in the user's location. Software supporting the system allows the user to look for information electronically in much the same way that he would look manually through a library's card catalog.

If the results of the search are short, they can be displayed and reviewed at the user's CRT screen. Longer responses can be directed to SDC's data center, where they will be printed and mailed to the user.

The SDC search service carries a charge only for the time the user is actually tied to the system. SDC is based at 2500 Colorado Ave., Santa Monica, Calif. 90406.

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Guide Discusses Security Perils

LYNBROOK, N.Y. — The *Guide to Database Security With On-Line Systems,* recently published by Infopac Associates, Inc., is directed at both the DP practitioner and staff and line managers outside DP, according to a spokesman.

After a snapshot view of the history of DP-oriented data security, the book describes what the publisher calls "the recent climate" in government and international institutions.

It then discusses in turn the security problems — and possible solutions — related to terminals and terminal-based systems; data communications networks utilizing common carrier facilities; and data bases.

The 116-page book is available for $24.95, which must accompany the order. More information is available from Infopac, P.O. Box 591, Lynbrook, N.Y. 11563.

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"We wanted a Fixed Asset system that was comprehensive, flexible, yet easy to understand and use. We needed multiple control levels defined in terms familiar to the user. The system had to have a complete audit trail per period/per asset, two sets of books for tax and corporate reporting requirements, and the ability to interface with our other computerized systems.

"The system had to be able to perform various depreciation methods. We wanted the capability for straight line, declining balance, and sum-of-the-years' digits, as well as the ability to calculate double-declining balance percentages from 1-200 percent.

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'Econ' Puts Console Work For DOS, DOS/VS on CRT

RICHMOND, Va. — The Extended Console (Econ) system from The Computer Software Co. (TCSC) provides users of IBM's DOS or DOS/VS or TCSC's Extended DOS (Edos) or Edos/VS environment/VS environments with previously unavailable console management capabilities, according to a spokesman.

Econ takes I/O requests directed to and from the operator console and posts them to a Dasd file. It subsequently displays them on the computer console or on IBM 3270 and compatible CRT terminals operating in local mode.

The package has several features in common with others designed to speed up the operator interaction with the CPU, but it also appears to offer some capabilities that are unique. Console spooling support, management of multiple outstanding console reads and message "preanswer" capability are among the almost conventional features. So is backing for programmable function keys, the spokesman acknowledged.

One of the prime advantages offered by Econ or the other console management packages is freedom from the relatively slow IBM 1052 console typewriter with a largely mechanical printing system. But Econ avoids the blur of messages scrolling on a CRT screen by providing a separator between the newest and oldest line on the screen, the company claimed.

The system also supports automatic console transfer, which means that Econ enables any terminal in the system to be used as a console as the need arises and without special setup work. Inherent in this feature is a lockout of other "consoles"; a major use of the capability might be for on-line testing, the spokesman suggested.

The package supports end-of-job logging so programmers working with TCSC's PDMS or any other development system can get printouts of their console messages along with whatever normal printout they receive after test runs. The package costs $5,500 or $150/mo and can be ordered from TCSC at 6517 Everglades Drive, Richmond, Va. 23225.

Option Drives Ledger On-Line

NEEDHAM HEIGHTS, Mass. — IBM-oriented users of the General Ledger/Financial Analysis (G/L Plus) from McCormack & Dodge Corp. now have an extra-cost on-line option to consider.

The basic batch-based package handles multiple-corporation processing of financial accounting and statistical data, including user-defined editing of input, accruals and reversals, updating of all records following retroactive journal entries and suspense transaction generation.

Called G/L Plus/On-Line, the option gives users instant reference to account information stored in the general ledger system. It can also be used for on-line journal entry, editing and correction capabilities, the vendor said.

In addition, G/L Plus/On-line offers a master file inquiry and journal posting and inquiry modes.

Users can either correct transactions at the time of entry or defer correction to a more convenient time. This, the vendor said, allows the accounting manager to delegate the on-line journal entry tasks to data entry personnel.

All journal transactions entered online are stored for later batch processing.

Designed for users of IBM 360, 370 and compatible mainframes using G/L Plus and IBM's CICS or IMS/DC teleprocessing monitors, the on-line option costs $10,000.

Written in ANS Cobol — and available for Burroughs Corp. or Honeywell, Inc. users and well as those with IBM gear — the basic application package costs $38,500 for DOS shops or $42,500 for OS installations, the vendor said from 560 Hillside Ave., Needham Heights, Mass. 02194.

DOS/MVT Tied To 'CA-Jasper+'

JERICHO, N.Y. — Users of the DOS/MVT operating system from Software Pursuits, Inc. can now consider the use of CA-Jasper+, the accounting/performance measurement package from Computer Associates.

CA-Jasper+ was originally designed for DOS users and has since been extended to support DOS/VS and DOS/VSE sites as well. The software allows the user to measure system resource utilization and performance through standard and customized reports.

DOS/MVT is California-based Software Pursuits' alternative to IBM's DOS and its derivatives. It reportedly provides DOS users with many of the complex facilities of OS within the simple and limited resource requirements of the DOS environment.

One of DOS/MVT's important features is the job accounting data it produces. The new interface allows CA-Jasper+ to operate within the DOS/MVT environment; job accounting data generated by DOS/-MVT may be added to the reports normally produced by CA-Jasper+

CA-Jasper+ with the DOS/MVT interface costs $7,500 and can be ordered from Computer Associates, 125 Jericho Tnpk., Jericho, N.Y. 11753.

Course to Teach Internals of MVS

AVON, Conn. — A five-day intensive course on the internal logic, system design and performance of IBM's MVS operating system is being offered by Computer Systems Research, Inc. (CSR) in Vancouver, B.C., next week and in Hartford, Conn., in January.

Designed for technical, supervisory and system personnel responsible for planning, implementation and support of MVS in a production environment, the course will emphasize the differences between MVS and previous IBM operating systems such as SVS and OS/MVT, a spokesman said.

To be taught by Howard Gilbert, who provides systems programming support at Yale University, the course costs $890 per person, CSR said from 195 W. Main St. Avon, Conn. 06001.

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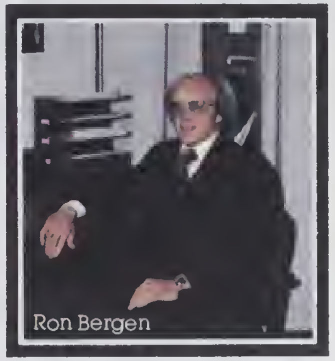

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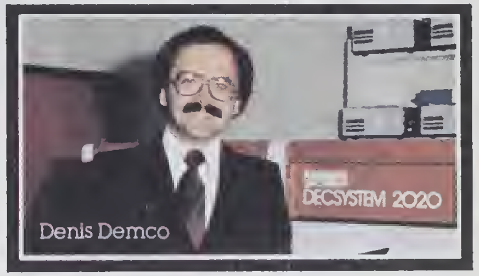

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Pondering Possibilities — Part 1

Language Choice Impacts Coding Effectiveness

Cobol is now considered the *standard language in many installations, and there is much to be said in favor of such an arrangement. But Cobol isn't the only language around and, as the accompanying article illustrates, active consideration of the appropriate language for a particular application can make a big difference in the end product.*

In this first of two articles, a vice-president at Computer Associates defines the problem his company faced and the reasoning behind the rejection of some languages.

Next week, he describes why Pascal was chosen and the advantages and disadvantages that choice has provided.

By Russ Artzt
Special to CW

A few years ago, there was prolonged and loud discussion in the computer industry about the crisis we were all facing over the lack of qualified programmers.

Since then, the number of installed computers requiring programmer support has increased perhaps tenfold — with the expectation that such quantum jumps will continue.

Coupled with this has been the even more rapid increase in computer power . . . power that allows more complex multiprogramming environments . . . which require yet more programmer support.

Obviously, any software package that can help reduce the number of man-hours needed to develop programs, or allow less qualified programming personnel to be more productive, is very much to be desired; hence — report generators like CA-Earl that we at Computer Associates market or a dozen others.

Our problem, however, was that CA-Earl was written back in 1971 with design specifications too limited to handle increasingly diverse programming jobs. Although constantly updated, the original design concept could not be circumvented.

Nevertheless, in spite of its limitations, investigation among users showed that an increasing percentage of day-to-day programming was being handled with CA-Earl rather than with the higher level languages like Cobol or PL/I. No doubt this is also the case with other report writers.

Apparently, Ca-Earl's ease of use and economy of coding had won over supporters who wanted to see an extension of its capabilities to permit wider application. External pressures were placed on us to extend the product's scope.

It was time to apply major surgery to the package — but how, to what extent and with what was still to be determined.

Design Criteria

Our first step was to fix design specifications. Surveys of our existing user base resulted in a long list of design objectives. The new CA-Earl would have to provide users with a high-level language covering the majority of daily programming requirements, reduce coding and elapsed time to 10% of that required with Cobol or PL/I, dramatically improve file-handling capabilities and offer a number of significant enhancements.

In addition — and of extreme importance — the new version would have to be sufficiently open-ended to allow extensive additional development over the years.

Our development group carried out a feasibility study to determine, first, the degree to which CA-Earl would need to be modified to allow continuing extension of product capabilities and, second, what it would cost in terms of time and money.

We quickly found that CA-Earl's original design concept was entirely too limiting. To provide the package with the structure needed to permit long-term extended growth, it would be necessary to redesign it from scratch. We then had to decide whether a complete rewrite could be accomplished within an acceptable time scale.

In the meantime, we added two more "musts" to our lengthy list of design criteria: the new version would have to be at least as fast in operation, and it would have to have maximum "transportability" between IBM and other computer manufacturers.

Language Evaluation

Finally, we came to the question of the programming language to be used. One of the problems inherent in the development of system software — as opposed to large-scale application software — is that it must be extremely efficient in its utilization of system resources.

Until now, this has dictated the use of the assembler programming language. However, as each hardware manufac-

(Continued on Page 46)

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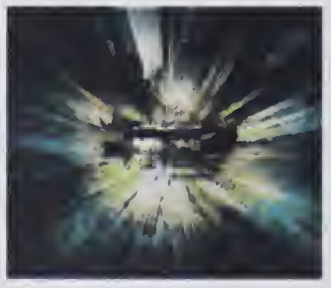

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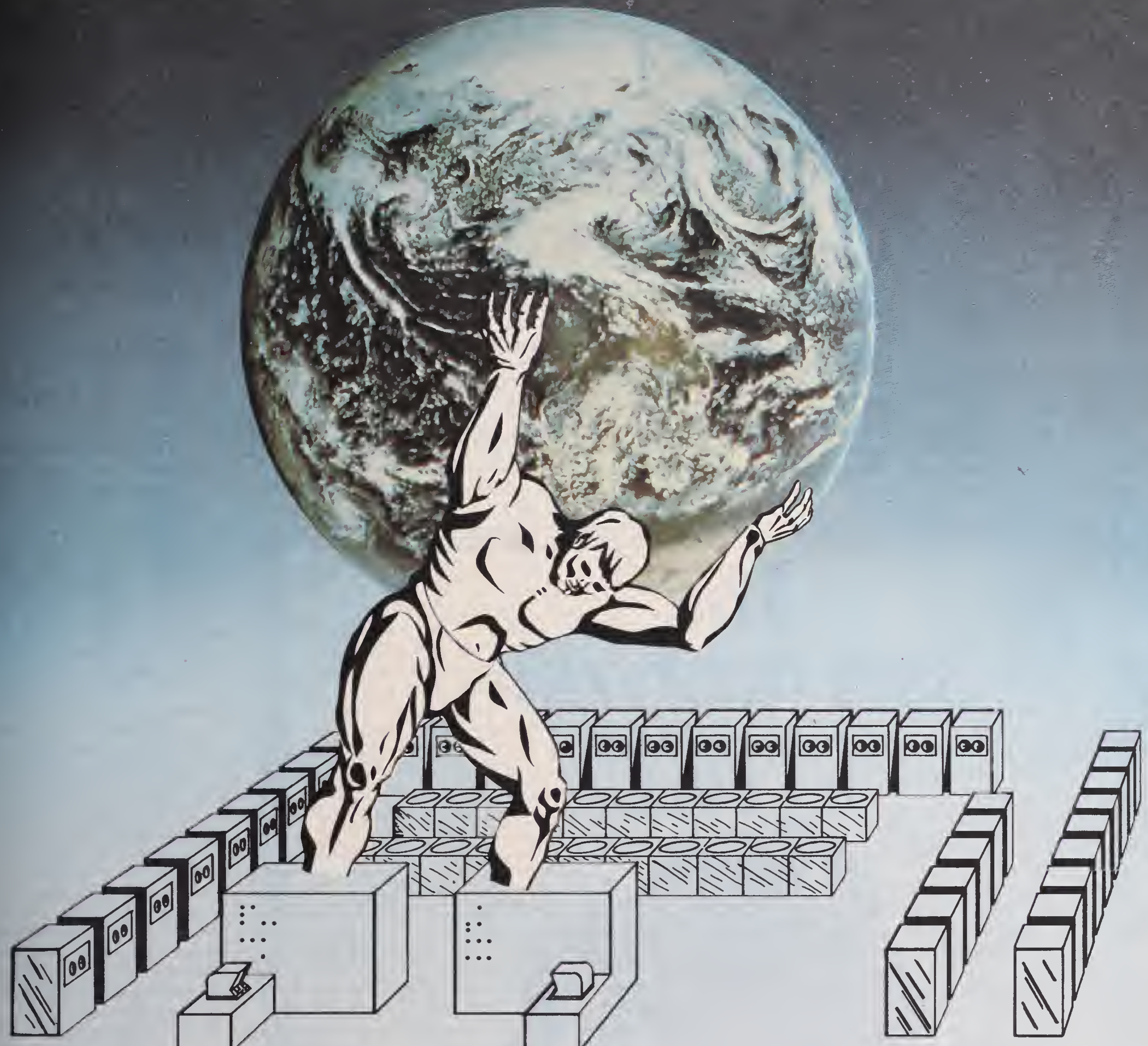

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'CBLShort' Updated

LYONS, Ill. — An updated version of the Cobol precompiler called CBLShort is now available from General Electronics for IBM-based installations.

First introduced in 1965, the basic package provides the user with a list of abbreviations for many of the heavily used reserved words in ANS Cobol. The precompiler also allows the user to supply his own set of abbreviations for data and procedures he expects to use extensively.

CBLShort expands these abbreviations and reformats the entire program in which they are used, for easier reading and maintenance. Paragraph names are sequence numbered and all references to them are changed accordingly.

The current update — officially Release 5 of the package — includes a "self-adjusting" abbreviation table, presumably enabling the user to add or delete abbreviations and expansions dynamically; optimized code for faster precompilations; and automatic handling of any existing numbered paragraph names using three-, four- or five-position sequence numbers.

Available on a 30-day free trial, CBLShort costs $50/mo or $1,200 for a three-year license. Source code — ANS Cobol — is available for $5,000, with continuing maintenance costing $200/year.

General Electronics can be reached at P.O. Box 79, Lyons, Ill. 60534.

Heating Loss Calculated

WELLESLEY, Mass. — Keydata Corp. has introduced a software system that is said to "drastically reduce" the time required to calculate heating system boiler and baseboard requirements.

Keydata's program calculates the anticipated heat loss, in British Thermal Units, by using standard heat loss formulae and defined structural and environmental factors.

Factors considered include room dimensions, wall space devoted to glass and to doors, infiltration, desired and lowest temperature, room location, building materials, insulation and type and quantity of insulation used, the spokeswoman explained.

With this information, the system determines the smallest boiler system required to replace the heat loss and the exact baseboard requirement for each room. Coupled with a price file of the heating system elements, this leads to the detailed estimates, the spokeswoman added.

The software is available as part of the Data General Corp. based Unity series of minicomputer turnkey systems her company offers, she said from Keydata at 20 William St., Wellesley, Mass. 02181.

Language Choice Affects Program

(Continued from Page 44)

turer has its own unique computer design — and thus its own unique assembler — transportability of CA-Earl would suffer.

In any case, we were aware of a whole new generation of software development languages that had come into being, among which were Pascal and PL/370. We decided to evaluate each of the languages available to us and investigations were carried out on assembler, Cobol, PL/I, PL/370 and Pascal.

Essential criteria were reliability, efficiency of resource utilization, cost-effectiveness in terms of coding time and straightforward transportability.

Assembler was rejected because its very strength in terms of the precision with which it could be used was also a weakness, given certain limitations in time and availability of development resources.

In addition, the flexibility of its one-for-one instruction set would have prevented us from significantly reducing the 40,000 lines of source code in the original version.

Furthermore, assembler is a "free" language in that compilation is performed without any logic-testing constraints. We felt that a high-level language incorporating a logic-testing capability at the compile stage, together with a macro instruction capability, would significantly reduce development time.

Further investigation would show whether such a language could match the performance of an assembler-produced package.

Cobol and PL/I were rejected because of the potential size and performance loss in the resulting package. Both languages are insufficiently precise and equally tedious in terms of superfluous source code generation.

In addition, neither language is particularly "forgiving" in subsequent package maintenance — unlike assembler, for example, which permits easy patching to resolve simple problems without the need for recompilation.

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Twenty Information Providers Signed

Bell Canada Planning Large Videotex Test

By Phil Hirsch

CW Washington Bureau

OTTAWA — More than 20 business and government "information providers" have agreed to participate in Bell Canada's forthcoming videotex test, the largest one announced to date by any country.

The test of the videotex service, dubbed Vista, will involve 1,000 home and business users in Ottawa and Toronto.

Using a standard color TV set connected to a voice-grade telephone line, each user will be able to request a variety of information from a computerized central data base and see the information displayed on the TV screen less than one minute afterward.

Library-type information retrieval, specialized news and weather reports and up-to-the-minute stock and commodity quotations are among the services that will be offered, along with airline schedules, restaurant and theater offerings and prices.

Viewers will also be able to make credit card purchases of a wide variety of products and services through the system. In addition, Vista will compute tax returns and balance bank statements, using data input by the viewer through a keypad about the size of a pocket calculator. The keypad is part of the terminal equipment.

Besides these new services, Bell Canada plans to offer "several terminal innovations," Vista project manager Gordon C. Johnson reported.

U.S. Watching Closely

The Bell Canada test is being watched closely in the U.S., where a number of videotex field demonstrations are likely to get started within the next year or two. Among the developers south of the border are Knight-Ridder Newspapers and General Telephone & Electronics. AT&T has a small pilot test underway in Albany, N.Y., while all three of the major U.S. TV networks are conducting technical evaluations of teletext, an alternative method of transmitting information from a central data base to commercial TV sets installed in homes and offices.

An integrated videotex terminal, one that combines a tele-

(Continued on Page 48)

International Telex Rates Plummet

CW Washington Bureau

WASHINGTON, D.C. — International Telex rates dropped 25 cent/min on Nov. 17 for most U.S. users who lease their own terminals and access lines. A short time earlier, the same users had received a 30 cent/min reduction [CW, Nov. 12].

Before the rate cuts became effective, the U.S. international record carriers (IRC) provided tielines and terminals to their Telex customers located in gateway cities (New York, Washington, Miami, New Orleans and San Francisco) for very little money. Users can now continue this arrangement or lease tielines and terminals and receive the 55 cent/min reduction.

However, gateway customers who do business with TRT Communications, Inc. will continue receiving tielines and terminals at cut rates in addition to this lower rate.

FTCC Communications, Inc., a French-owned U.S. IRC, was offering only a 30 cent/min saving at press time, but reportedly was on the verge of increasing it to 55 cents.

Outside the gateway cities, international Telex customers have essentially the same choice: they can continue accessing the IRC switch centers at the carrier's expense or obtain their own facilities and receive a rate reduction.

Meanwhile, the battle over Western Union's international Telex service continues. Early last month, the telegraph company began routing international messages from U.S. Telex/TWX subscribers to carriers in Canada and Mexico, which then transmit the communications overseas.

The rates for this service are up to 30% less than those charged by the U.S. IRCs. For example, Western Union charges $1.75/min to Austria, France, West Germany or Italy; the IRCs charge $2.50 for equivalent service.

Western Union's new offering is available on a one-way outbound basis only; users can send Telex messages to a total of 19 countries — mostly in Europe, Central and South America, but including Japan and mainland China. The participating foreign carriers are CNCP Telecommunications in Canada and Telecomex in Mexico.

The IRCs have vigorously protested the new service in petitions to the Federal Communications Commission (FCC).

(Continued on Page 48)

Tokyo Bank Starts Worldwide Net

NEW YORK — The Bank of Tokyo, Ltd. has begun the first phase of a worldwide network that will eventually link its 290 offices and branches throughout the world.

The Tohnet system is thought to be unique because it uses privately leased lines and will record transactions from any branch or office in the world in a host system in Tokyo.

The framework of the network is already in place. Three Digital Equipment Corp. PDP-11/45 minicomputers located in New York, Tokyo and London are linked by satellite and connected to a large host system in Tokyo, a Facom M-190 developed by Fujitsu, Ltd.

The overall communications network was designed in accordance to Bank of Tokyo specifications by Digital Computer Ltd., DEC's systems development arm in Japan.

When branch offices in the Americas, Asia and Europe are connected to their respective minicomputers in New York, Tokyo and London, each branch will be available to initiate interactive communications with any of the other 289 branches in the worldwide system, according to a spokesman.

The Tohnet system will feature automatic dialing of Telex numbers, connect with the Society of Worldwide Interbank Financial Telecommunications (Swift) and relay credit data.

For the New York-based operation, branches will all have minicomputers and handle automatic bookkeeping and accounting information on remittances. These branches will be able to send and receive information simultaneously, which should eliminate the need to send cables back and forth between the branches, according to the spokesman.

The Tohnet system was designed to accommodate the bank's projected growth over the next 10 years, he added.

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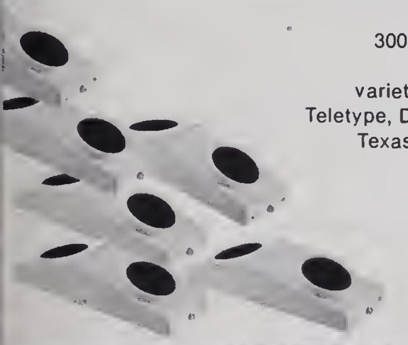

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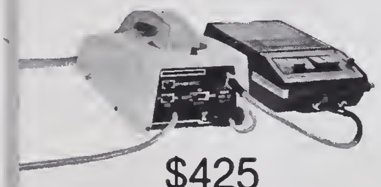

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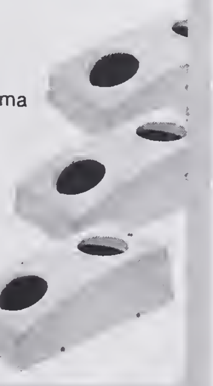

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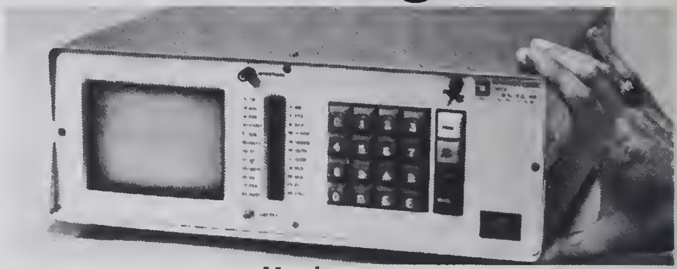
Test Set Permits Remote Interactive Diagnostics

LINCOLN, R.I. — A microprocessor-based diagnostic test set from International Data Sciences, Inc. (IDS) reportedly offers network users interactive diagnostics and passive monitoring capabilities.

The Hawk 4010 locates and isolates problems in hardware and software by simultaneously transmitting and receiving data through its RS-232C interface and displaying it on a 5-in., 512-char. CRT.

With it, field service personnel can monitor and record serial data or actively communicate with local and remote network equipment. The 4010 can be programmed to "trap" and recall up to 4,096 characters of data for further visual analysis.

The unit was designed to detect equipment malfunctions, transmission errors or inherent software problems when used by a trained operator, IDS said.



Hawk 4010

The diagnostic sytem operates with bisynchronous, Synchronous Data Link Control, High-Level Data Link Control, ADCCP, X.25 and any other synchronous and asynchronous protocol at data rates from 50- to 19.2K bit/-sec. Standard formats are Ascii, Ebcdic, hex, octal, Baudot, EBCD, Selectric, Ipars and Transcode, according to IDS.

The Hawk 4010 is fully interactive with modems, terminals and CPUs and can simulate a host computer, remote modem or remote terminal in a polling network. When used as a data monitor, it is bridged on-line to passively monitor and display on-line serial data without interrupting data flow, the vendor said.

The system is operated from a 16-key hexadecimal keyboard and a row of four mode switches. It utilizes an LED display panel to monitor EIA signal activity.

The Hawk 4010 costs $7,500, IDS said from 7 Wellington Road, Lincoln, R.I. 02865.

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Bell Canada Plans Videotex Test

(Continued from Page 47)

phone with a CRT, is an innovation likely to be included in the Bell Canada test. Johnson declined to go into details, but he did say that the "electronic telephone" might be one such terminal.

Significantly, AT&T seems to be moving in the same direction. Its Albany, N.Y., test utilizes an off-the-shelf CRT and keyboard connected through a telephone to a voice-grade telephone circuit. The terminal is being used solely to provide on-line telephone directory services to some 75 subscribers [CW, Sept. 6]. But Bell officials have made it clear that if the present, limited experiment — scheduled to be completed in January — is successful, they will test other applications and consider developing an integrated CRT/telephone that has built-in logic and memory.

Bell Laboratories' recent announcement of MAC-4, a single chip microprocessor for use in electronic telephones, is another straw in the wind.

Test Schedule

The Bell Canada test is scheduled to begin officially next September with installation of the first Vista terminals, but services won't be offered until January 1981. By December '81, when this test is scheduled to end, "we believe we'll know what services have the best possibility of generating the greatest demand," Johnson said.

The next step will be a market trial designed to find out how much home and business users are willing to pay for these services. It will last "at least a year," after which the company will decide if it wants to launch a full-scale commercial videotex service.

But Johnson indicated Bell is already more than half convinced it should go all the way. Barring unforeseen problems, this service would gradually grow out of the 1982 marketing test into a revenue-producing operation, serving home and business customers "by the mid-1980s," Johnson said.

Studies by others indicate the total market for videotex in Canada may be a million home and business installations, he added.

Besides Vista, several other videotex/teletext trials are underway in Canada:

- A two-way coaxial cable system is now being built by the Manitoba Telephone Co. in a suburb of Winnipeg. It will be the testbed for a videotex trial scheduled to begin in 1981. Reportedly, this test will run six months or less and be followed by a commercial service.

Meanwhile, in Montreal, Telecable Videotron has won government funding for a similar test. The programming will be largely or completely in French. Manitoba Tel is launching a second trial in the small town of Elie. This one features a star-shaped fiber-optic transmission network extending a maximum of about 10 kilometers from a local exchange.

The system will provide single-party telephone service, 12 TV channels, 9 FM channels and limited two-way TV (utilizing TV camera terminals), as well as Telidon-based videotex service.

- In Alberta, the Provincial Telephone Co. will begin a telephone network-based videotex trial early next year. Each Terminal will be connected to a digital local loop separate from the telephone line, eliminating the cost of a modem along with telephone interference.

Alberta General Tel is also going to use a modified Telidon interface unit — a cost-cutter that provides a resolution of 120 by 60 picture elements.

The interface unit (decoder) to be used in the other Canadian test will provide four times greater resolution, but at a higher cost because of the additional memory required.

- The Ontario Educational Communications Authority has begun transmitting teletext frames via Canada's Anik B Satellite. The information is received by on-site earth stations having diameters as small as 1.2 meters (4 ft).

International Telex Rates Drop Another 25 Cent/Min

(Continued from Page 47)

RCA Global Communications called it "a blatant violation" of Section 222 of the Communications Act, which bars the telegraph company from offering international communications services.

Western Union, however, insists it is not providing international Telex service "except in the same limited sense that it always has . . . by interconnecting its Telex and TWX networks with the facilities of other carriers."

ITT Worldcom, fearing that the FCC will not resolve this argument for some time, asked the U.S. district court in New York City to issue an injunction barring Western Union from continuing new service.

"It puzzles me why the FCC can't act . . . immediately," Judge Charles T. Brieant told ITT's lawyers. "I don't understand that this court has any jurisdiction . . . to be a pinch hitter for a group of negligent or slow bureaucrats."

The court ultimately issued an order requiring the FCC to state its views regarding the new service early next month.

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Firm Trims $25,000 Off Yearly Phone Charges

CARLISLE, Pa. — A large supplier of carpets to the automotive industry reportedly cut $25,000 off its $300,000-a-year telecommunications costs last year after installing a computerized telephone usage accounting system.

Monthly long-distance costs alone have dropped by $1,000, according to B.C. (Bud) Gardner, secretary-treasurer and chief financial officer at C.H. Masland and Sons, Inc. Major savings have come from greatly increased use and efficiency of the firm's Wats lines.

The system — a microprocessor-based Digital Telephone Systems (DTS) D1201 PBX, in combination with DTS' Detailed System Message Accounting (DSMA) system — was installed 18 months ago and brought into full operation a year ago. It not only has reduced telecommunications costs but has reportedly improved the speed and accuracy of Masland's service to customers.

The PBX serves 325 station lines and 52 trunks. The telecommunications system also includes 30 Wats lines — 22 inbound and eight outbound trunks.

The DSMA collects call record data on PBX trunks and stores it in three-day chunks either on reel or cartridge tapes for batch processing. As one of its features, the system identifies "nonefficient" calls, such as a call made on a Band Five Wats line (all U.S.) when a Band Two (300-mile radius) line should have been used.

When the report identifies calls that cost more than average they are brought to the attention of company personnel concerned with reducing communications costs. As a result, unnecessary or incorrect Wats usage has been reduced to an acceptable $100 a month, Gardner indicated.

Masland's system establishes two-way hardwired communications between the PBX common control and the PBX. A software package in the PBX, based on an Intel Corp. 8080 microprocessor, controls the operations of call recording units.

The PBX micro and the 8080 micro are linked by a "peripheral interface unit" that acts as a buffer between them, storing data until it is read out by the receiving micro.

Spotting Trends

The call data tapes produced sequentially by the DSMA are sent out and processed by a Burbank, Calif.-based service bureau called Account-a-Call. Since timing is not critical — "we're looking for trends," Gardner said — Masland is satisfied to receive the reports about 10 days later.

Examples of the reports produced from the data include a monthly detailed traffic data report for each extension listing all non-local incoming and outgoing calls and summaries by departments, by division and for the entire corporation. Other reports include an analysis of all exception calls — those that exceed five minutes or $15 in charges.

The reports have helped the company determine, among other things, how many of its flat-fee, 24-hour-a-day Wats lines should be kept and how many should be changed to less expensive, measured-time Wats lines.

The system can also pick out those customer service personnel who handle calls more quickly than their co-workers. These people with short usage rates may be able to assist in developing time-saving techniques of their own, Gardner said.

Much of Masland's business is based on telephone communications. In addition to communication between its three manufacturing plants here and in Atmore, Ala., and Toronto, Canada, Masland communicates with its busy Detroit office and with more than 3,000 customer rug retailers throughout the country. The firm receives nearly 5,000 calls a week and nearly 1,000 customer orders.

Because almost 100% of its carpet orders come over the phone, Masland was able to take advantage of the PBX's automatic callback feature.

Before the system's introduction, Masland employees who could not get an outside Wats line either used an inefficient Wats line or made a direct long-distance call "around" the Wats lines. Now, if a call can't go through, the user hangs up. Later, when a Wats line is free and the user is not making another call, the PBX automatically dials the number.

The call-back feature has reportedly reduced the frustration callers feel when a Wats line is not immediately available. "We have made a quantum jump in efficiency in utilization of the Wats lines with the automatic call-back feature," Gardner declared.

To further enhance the system, the manufacturer plans to track the number of calls to its customer service department, the length of the calls and how many are put on hold.

ITT Expands Packet Service For Users in Puerto Rico

SAN JUAN, P.R. — Computer users here can gain access to Telenet and Tymnet networks on the U.S. mainland through an expanded packet-switching exchange installed here at ITT Diversified Services by GTE Telenet Communications Corp.

Leased-line service to 9,600 bit/sec and dial-in service at speeds to 1,200 bit/sec are available through multiple 9,600 bit/sec channels to the ITT World Communications, Inc. packet-switching exchange in New York, which is interconnected to the Telenet and Tymnet networks.

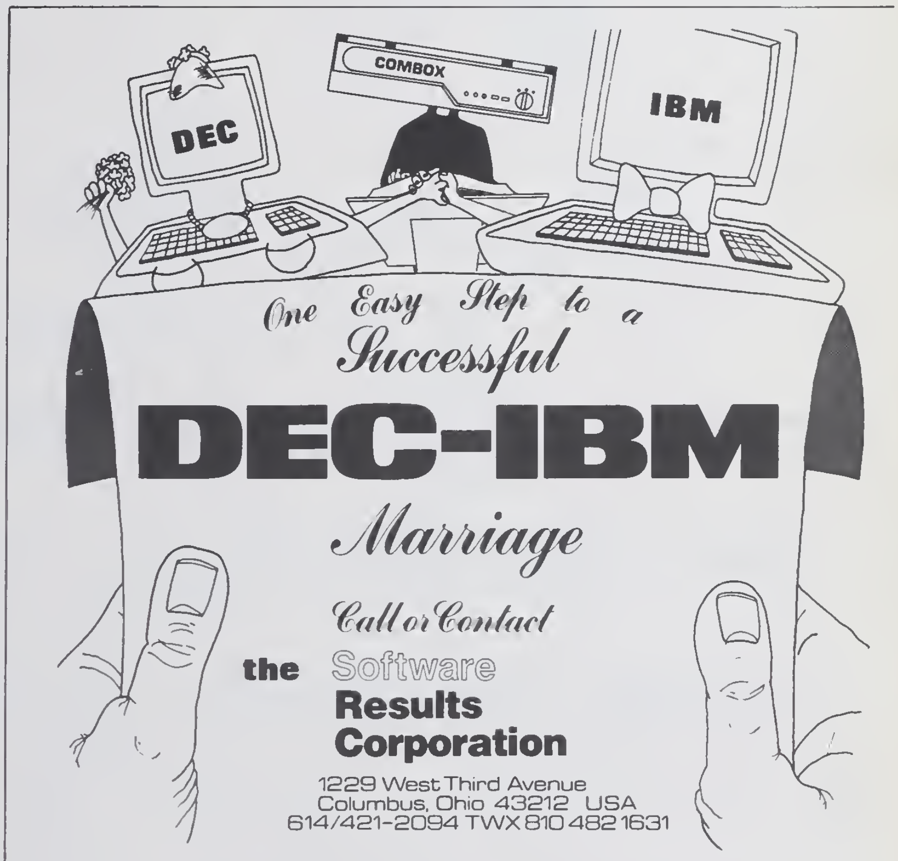
Business and industrial organizations can, reportedly for the first time, link computer systems to the ITT gateway and transmit data over shared transmission lines to terminals or computers on the mainland, GTE said.

The packet-switching equipment includes fully redundant TP 4000 communications processors which incorporate error-control features, remote diagnostic capabilities and compatibility with CCITT international protocols for interfacing user equipment to public data networks, the firm said.

Tariff for X.25

Service for asynchronous communications is now available, but a special tariff for X.25 access has yet to be submitted to the Federal Communications Commission for approval.

The new tariff would offer more attractive rates for bulk transmission, according to a spokesman.



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Switching System Handles 2,000 Users

DOYLESTOWN, Pa. — An intelligent automated switching system is said to provide universal access among a maximum of 2,000 subscribers in a multiprocessor, multiuser environment.

The Dataswitch 9003 from Develcon Electronics, Inc. reportedly links dial-up or leased-line modems, local terminals, limited-distance data sets or any equipment with an RS-232C interface.

It can be used to replace switched-network connections provided by the phone system, but offers higher transmission rates to reduce the cost of CPU time, Develcon claimed.

The system automatically intercepts a subscriber's request for service, checks the availability of the requested service and either completes the connection or informs the calling subscriber in plain language why the connection cannot be made. If the requested service is busy, the subscriber is placed on a priority queue and advised on how many calls precede that call, a spokesman said.

Dataswitch is transparent to the subscriber terminal's bit rate or character set and will maintain a connection until either the caller or receiver breaks it.

The central control element of the system is the 9201 Dataswitch Supervisor (DSS) module. Subscriber line interface modules connect to it, as do any number of 9203 Subscriber Protocol Supervisor (SPS) modules and a 9202 System Operator Interface (SOI) module.

The SOI module provides manual system control and programming capabilities and enables the user to make sytem checks. It can split subscribers into groups by establishing a directory to speed connections between those subscribers with the same attributes. Four levels of priority are assigned to subscribers.

The system's multiplexer will support a bidirectional throughput rate of approximately 2.4M bit/sec at up to 3,000 bit/sec per user.

Cost of the Dataswitch 9003 is $11,300 plus an approximate cost of $110 per connection.

Develcon is located at 200 North St., Doylestown, Pa. 18901.

Halcyon 802A Data Monitor

Halcyon Unveils Data Monitor

SAN JOSE, Calif. — A data monitor that reportedly requires no programming or switch-setting is available from Halcyon, Inc.

The 802A data monitor accommodates any data rate from 50 bit/sec to 19.2K bit/sec and has a 7-in. CRT that displays up to 1,024 characters. It reportedly measures turnaround time automatically, and a basic transmitting capability permits polling of terminals or sending a block of just-received data to a terminal or printer.

Other features include statistical error analysis, a storage capacity of up to 64K bytes (minimum storage is 4K bytes) and display of continuous key configuration prameters, Halcyon asserted.

Optionally, the 802A can drive a color monitor of any size and do onboard recording for permanent buffer storage.

Cost with 4K bytes is $6,900 Halcyon said from 2121 Zanker Road, San Jose, Calif. 95131.

Word Processor Gains Interface

WELLESLEY, Mass. — Users of Algorithmics, Inc.'s, a Model 2100 word processing and office information system can reportedly communicate with other automated office machines through Algorithmics' universal communication interface.

The device permits an Algo-2100 user to transmit documents to and from other word processors, phototypesetters and computers at speeds from 65 bit/sec to 9,600 bit/sec using an RS-232C interface.

For word processing applications, an operator can connect to any remote system, word processor or computer and transmit documents between the Algo-2100 diskettes and another system.

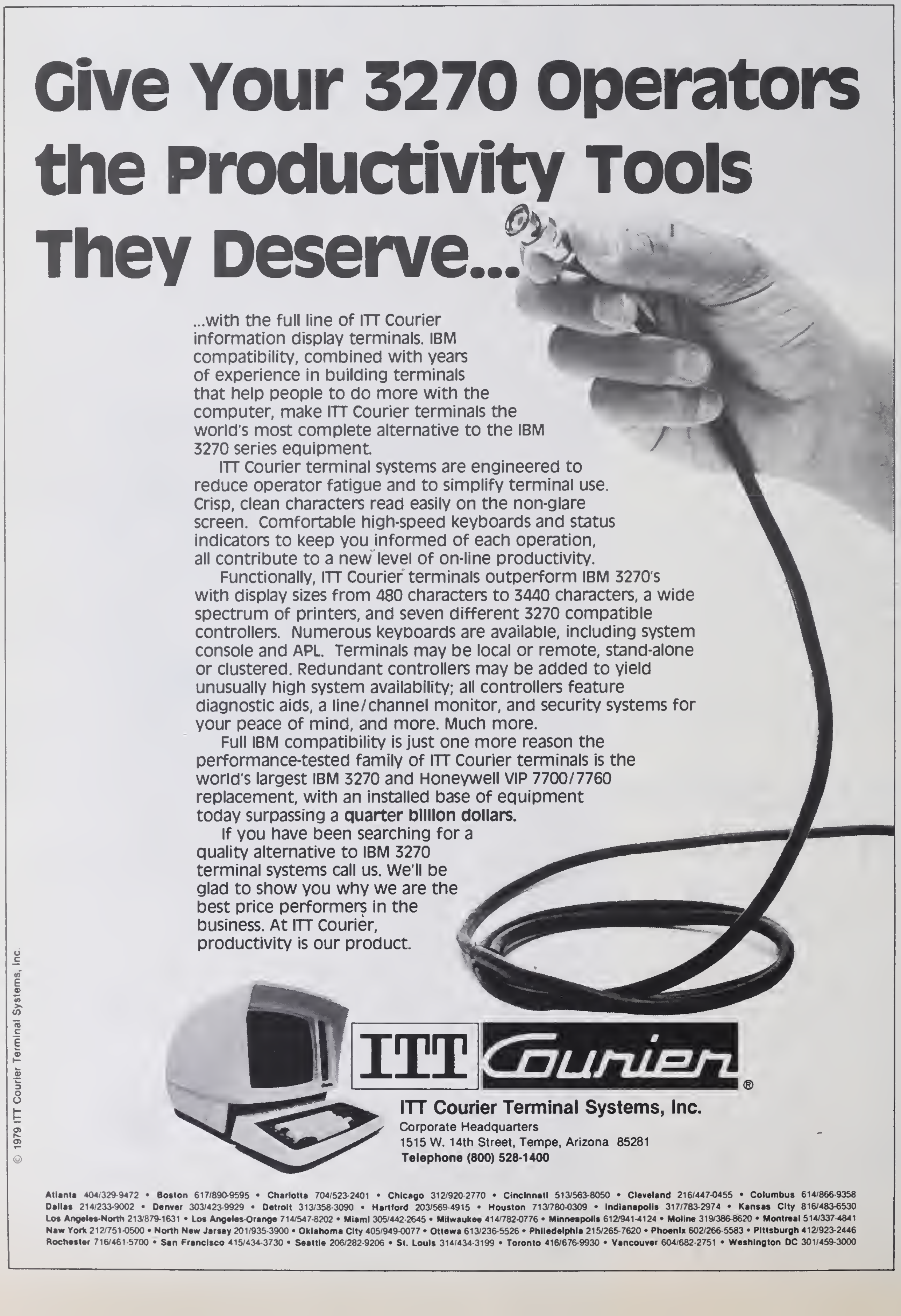
The communications option is distributed in the form of a plug-in hardware upgrade to Algo-2100 systems with a modem and a diskette containing the communications software. It costs $1,200 from 177 Worcester Road, Wellesley, Mass. 02181.

Tymnet Has Directory

CUPERTINO, Calif. — Tymnet, Inc., has prepared a 34-page subscribers' directory describing more than 200 data bases offered through the Tymnet network.

The data bases cover medical, financial, commercial and scientific information, to name a few types, and the directory lists the source of each data base.

Copies of the directory can be ordered for $5 by writing Directory, Tymnet, Inc., 20665 Valley Green Drive, Cupertino, Calif. 95014.



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Our DEC Datasystem 540 brings a new level of power to mid-range distributed processing systems.

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And to make sure you get all the benefits of this increased capability, we've also increased the uptime with plenty of reliability features. Like a microprocessor-controlled ASCII console. Plus facilities for optional remote diagnosis for 24-hour-a-day, 7-day-a-week service with an average response time of less than 15 minutes.

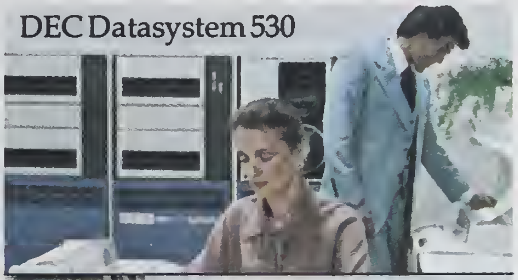
But what really sets the DEC Datasystem 540 apart from ordinary computers is the distributed processing software that comes with it: Digital's proven CTS-500 operating system.

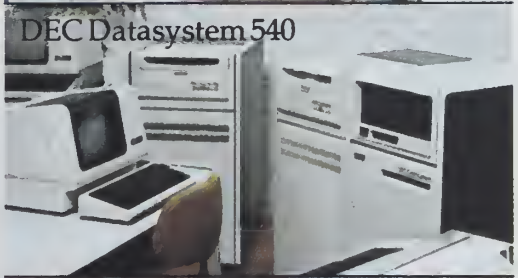
And now we're introducing major new enhancements to CTS-500. Combined with the performance improvements of the D540, it means you get response times 50% better than with comparable systems.

You also get superior interconnect capabilities. Because with CTS-500, the DEC Datasystem 540 can emulate the popular IBM protocols, plus others as well.

In addition, CTS-500 is designed to be easy to use for a wide variety of jobs. For transaction processing, batch processing, word processing, and program development. All at the same time.

But the DEC Datasystem 540 is more than an exceptionally powerful mid-range business computer.


DEC Datasystem 530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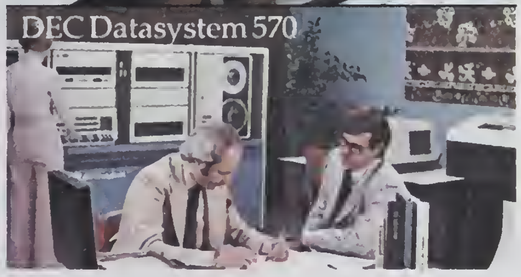
DEC Datasystem 570

It's part of the broadest range of COBOL-compatible interactive systems.

The DEC Datasystem 500 family now offers the widest choice of COBOL-compatible systems in the industry. From the economical D530, through the D540, all the way to the high-end D570.

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digital

Net Test System Works With Any Modem

SAN MATEO, Calif. — A modular network testing and monitoring system from Kapusi Laboratories is said to be useful for networks that use modems or four-wire dedicated lines.

The Network Surveillance System (NSS) is compatible with any make of synchronous or asynchronous modem at bit rates up to 19.2K bit/sec, according to a spokesman. It works by connecting a central site modem and its corresponding lines to the data test set without having to interrupt data, he explained.

The NSS allows on-line monitoring of the local and remote RS-232C interface, the software (optional) as well as line level measurements, but does not require separate phone lines in order to work. Remote modems can be self-testing without interfering with other multidrops, according to the vendor.

Further, the system automatically makes analog line measurements such as level, noise and attenuation distortion, while a digital interface conforming to CCITT, ICC, ISO and Bell specifications tests bit errors, block error, bias, dropout and jitter, Kapusi claimed.

All parameters are checked in the transmit and receive direction, as well as in a looped configuration, the spokesman added.

The system is priced at about $50,000 for a typical small network. Kapusi Labs is located in Suite 615, Bay View Plaza, 2121 S. El Camino Real, San Mateo, Calif. 94403.

Seminars Slated in Four Cities

BROOKLINE, Mass.— Seminars on digital switching trends, digital communication and signal processing and fiber-optic communications have been scheduled in four cities next year by Information Gatekeepers, Inc.

Switching Trends

"Digital Switching Trends I" will cover basic plug-compatible concepts, digital networks, synchronization and systems review. "Digital Switching Trends II" will review basic switching concepts, the switching matrix, basic plug-compatible concepts, digital networks synchronization and systems design.

"Digital Communication and Signal Processing" will present fundamentals, applications and advance material on design, systems engineering and digital transmission systems and planning.

Fiber Optics

Information Gatekeepers will also conduct a seminar on optical waveguide communications called "Fiber Optical Communication." It will focus on the transmission medium, optical sources and detectors and systems design.

The courses will concentrate on practical information that those who attend can readily implement, according to a spokesman.

The limited-enrollment seminars are scheduled for New Orleans, Jan. 21-23; Dallas, March 10-12; Philadelphia, May 5-7; and Chicago, June 9-11.

More information is available from the Director of Seminars, Information Gatekeepers, Inc., 167 Corey Road, Brookline, Mass. 02146.

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Witness the Quick Tear that saves money by saving forms!

The Quick Tear option stops wasted forms, wasted money. It saves throughput time, operator time and customer time. Now you can remove a completed form after printing without wasting the next form. And for batch work, you can by-pass the quick tear assembly for continuous print runs.

Unique to Tally alone, the quick tear can accommodate variable width forms from 4 to 15 inches wide. The pin-feed tractors are adjustable from either side of the carriage. Print an original plus five sharp carbon copies. And Tally teleprinter operators give testimony to quieter operation, better key action and heftier construction.

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Remote Controller Designed For Static Applications

BEAVERTON, Ore. — A remote controller is available for use in data collection and process control, especially where the devices under its control use a routine and unchanging format.

The Physical Data, Inc. Model 609 was designed as an inexpensive alternative to minicomputers and programmable calculators when the applications do not require periodic program adjustments. It can also be used as an intelligent controller for data collector-logger systems, a spokesman said.

Programs are written by the user in a high-level Basic language into 4K bytes of random-access memory, then transferred to an internal programmable read-only memory. This eliminates tape-loading routines and ensures that when the controller is turned on, the program will be present and ready to run, according to Physical Data.

Features include serial or parallel poll and reception of BCD or Ascii messages, the ability to be transparent in a large system and a front-panel pass-fail test system. Connectors and controls are front-mounted and arrayed to help eliminate inadvertent operation, the vendor claimed.

The cost of the controller is $1,395 from Physical Data at Dept. 95, 8220 S.W. Nimbus Ave., Beaverton, Ore, 97005.

Graphics Institute Schedules Slate of Conferences

BOSTON — The Institute for Graphic Communication, Inc. (IGC) is offering two-day conferences relevant to remote processing during the first half of 1980.

IGC will hold "Integrated Information Systems," "Business Applications for Computer Graphics" and "Satcom '80" — a look at satellite communications — at the Highlands Inn in Carmel, Calif., on Jan. 20-22, Jan. 22-24 and April 13-15, respectively. The cost of attendance is $495.

"Computer Printers" is scheduled for Miami's Ramada Inn on Feb. 3-5. That conference and "Ink Jet Printing" will also be held at the Alpha Novotel in Amsterdam, The Netherlands, on June 4-6 and March 19-21, respectively. The cost for each of the conferences is $495.

Mass. Media

Finally, "New Developments in Printing Systems" and "Three-Dimensional Imaging" is slated for the Andover Inn in Andover, Mass., on May 18-20 and 20-22, respectively. Those conferences cost $460.

More information is available from Richard D. Murray, IGC director of conferences, at 375 Commonwealth Ave., Boston, Mass. 02115.

TC800 Gets Updating Station

NEW YORK — Olivetti Corp. of America has added the Automatic Passbook Updating Station to its TC800 line of banking terminals. The station was designed for customer use in a bank lobby.

The Updating Station should shorten tellers' lines for cashless and inquiry-type transactions, Olivetti said. It consists of a magnetic passbook printer and a CRT, which can be connected to any mainframe under the commonly used protocols, according to a spokesman.

To use the system, the customer reads a prompting message asking for the insertion of the passbook into the printer's magnetic front feed. The printer reads account information out of the passbook magnetic stripe while the intelligence resident in the station control unit interrogates the host computer about account activity.

The terminal has only one button and the entire updating procedure takes about 10 sec, Olivetti said.

An expanded version of the Updating Station will offer customized customer prompting where the user could retrieve a hard copy of any type of account balance.

The system, which can support two or more languages on a CRT, costs approximately $7,000 for an average configuration with the TC800 terminal, Olivetti said from 500 Park Ave., New York 10022.

Honeywell Units Print Demand Documents

WELLESLEY, Mass. — A pair of high-speed demand document-dispensing printers have been announced by Honeywell as additions to its Airline and Financial Industries Division's Series 9300 printer line.

The printers — models 9383 and 9384 — reportedly meet requirements for airline ticketing, insurance policy and claim notice production, waybill issuance and receipt and confirmation applications.

Available in floor-mounted cabinet console units, they are also designed for desktop, shelf, or in-counter installation as the models 9385 and 9386.

All four are compatible with Incoterm Corp. SPD 15 and SPD 20 units.

The printers cost $5,995, the vendor said from its Incoterm Operations at 65 Walnut St., Wellesley, Mass. 02181.

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Send us your old, worn out DEC* RP06 Disk Drive and Controller plus $3700—you pay the shipper —and we'll send you a brand new CDC-9766.

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What's The Catch?
If you're thinking there's a catch in the software, perish the thought. The CDC-9766 is completely software compatible with the RP06; but you'll need to change a couple of bytes in your operating system software if you want to use the extra 80 megabytes you've got on the new drive. That should take you all of a man-hour of work to do.

Want More Megabytes?
If 80 megabytes more storage isn't enough, send us your RP06 and $18,700—you pay the shipper—and we'll send you two CDC-9766's for a total of 512 megabytes. Want more? Or you've got nothing to trade? Just send us 15 grand apiece and we'll ship you as many CDC-9766's as you want. That's not bad, considering an RP06 from DEC runs you $36,650 new, or $32,000 used.

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A few lines on increasing the productivity of your computer.

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You'd find it hard to be productive, too, if you were right in the middle of manipulating important data, and you suddenly received a request for information you hadn't thought about for nanoseconds.

Yet, your very expensive, highly advanced CPU has to put up with interruptions like that all day long.

If your company had a Kodak IMT-150 microimage terminal, however, your computer could spend much more of its valuable time manipulating data. And a lot less time searching for it.

That's because the IMT-150 terminal has its own intelligence—a built-in microprocessor that enables it to perform on-line lookups in seconds. At the touch of a button. Without tying up your mainframe.

The IMT-150 terminal helps your people be more productive, too. They can find needed data quicker and easier, resulting in more lookups per hour/day.

And because source information stored in superdense microimages can be linked to complementary indexes in your on-line data base, you can reduce the cost of keeping non-dynamic information in a dynamic state.

The choice, then, is a simple one.

You can increase the productivity of your computer by buying *more* expensive and sophisticated data-storage equipment, in order to handle growing information demands.

Or you can buy a Kodak IMT-150 microimage terminal.

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☐ Please send me more information about the Kodak IMT-150 microimage terminal.

☐ Please have a Kodak representative contact me.

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Introducing the STRUCTURED LIFE CYCLE

A strong advocate of structured approaches to DP presents his overview of the structured project life cycle and details how its major activities fit together.

by Edward Yourdon

"The Structured Life Cycle" by Edward Nash Yourdon is excerpted from the forthcoming book A Software Development Methodology. *Copyright 1979 by Yourdon, Inc., New York, N.Y. All rights reserved.*

If you've been working in the data processing field for more than a few years, there's a good chance that much of this talk about "project methodologies" is familiar to you. You probably already have a project life cycle in your organization, and you probably have a number of opinions about it.

I'd like to begin with a brief review of the kind of project life cycle your organization is probably using right now — with some comments on how it differs from the one to which we'll be devoting most of our attention in this book.

The "classical," or "conventional" project life cycle is shown in Figure 1. Most of the phases, or activities, should be fairly familiar to you, and I won't bother discussing them in detail here.

Certainly, every project — whether "structured" or not — goes through some kind of analysis, design and implementation, even if it's not done in exactly the way I've shown it here. The project life cycle used in your organization, for example, might differ from the one shown in the following ways:

- The survey phase and the analysis phase may be lumped together into one phase. This is especially common in organizations where anything the user asks for is deemed at the outset to be "feasible."
- There may not be a phase called "hardware study," if it can be taken for granted that any new system can be implemented on an already-extant computer without causing any major operational impact.
- The "preliminary design" and "detail design" phases may be lumped together in a single phase simply called "design."
- Several of the testing phases may be lumped together into a single phase; indeed, they may even be lumped together with "coding."

Your project life cycle may have seven phases, or five phases or 12 phases — but it is still likely to be of the "classical" variety.

What is it that really characterizes a project life cycle as being "classical"? Three things stand out:

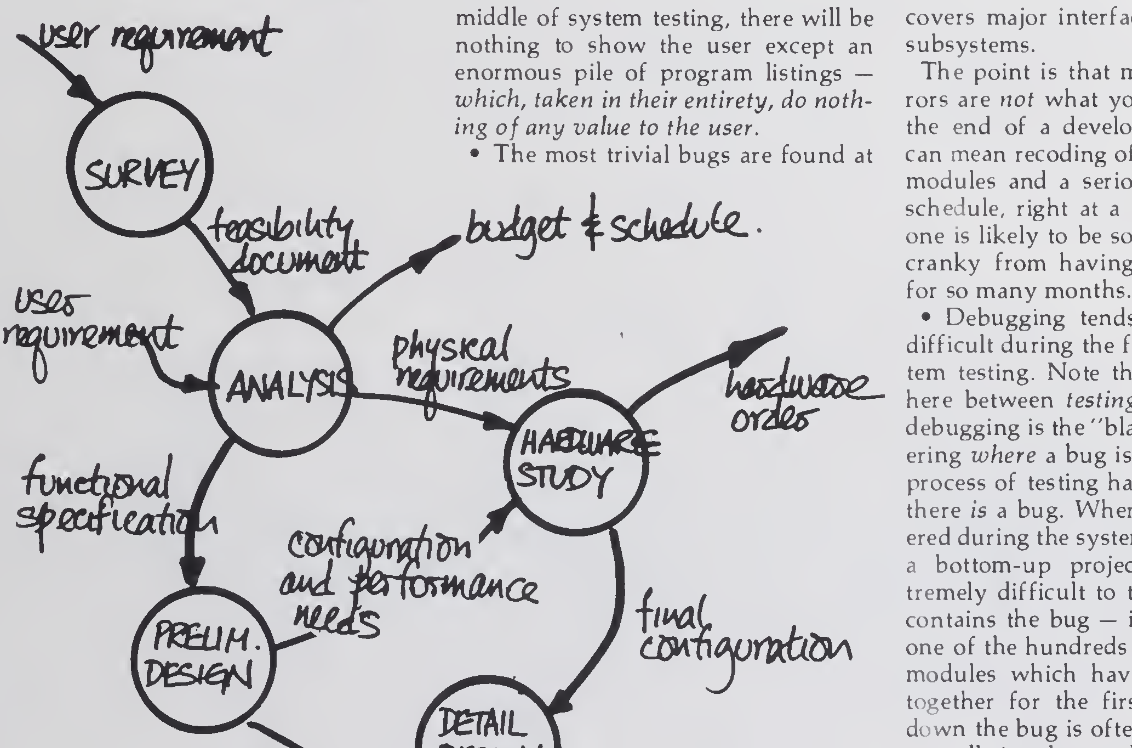

Figure 1:
The Classical Project Life Cycle

- A strong tendency toward bottom-up implementation of the system.
- An insistence on linear, sequential progression from one phase to the next.
- Little or no use of structured design, structured programming or other modern development methodologies.

The use of bottom-up implementation is, in my opinion, one of the major weaknesses in the classical project life cycle. As you can see from Figure 1, the project manager is expected to carry out all of his "module testing" *first;* then subsystem testing; and finally system testing.

I'm not quite sure where this approach originally came from, but I wouldn't be surprised if it was borrowed from "assembly-line" industries. The bottom-up implementation approach is a good one for assembling automobiles on an assembly line — *but only after the prototype model has been thoroughly debugged.* Unfortunately, most of us in the computer field are still producing "one-of-a-kind" systems, for which the bottom-up approach has a number of serious difficulties:

- Nothing is done until it's *all* done. Thus, if the project gets behind schedule and the deadline falls right in the middle of system testing, there will be nothing to show the user except an enormous pile of program listings — *which, taken in their entirety, do nothing of any value to the user.*
- The most trivial bugs are found at the beginning of the testing period, and the most serious bugs are found last. This is almost a tautology: module testing uncovers relatively simple logic errors inside individual modules; system testing, on the other hand, uncovers major interface errors between subsystems.

The point is that major interface errors are *not* what you want to find at the end of a development project. It can mean recoding of large numbers of modules and a serious impact on the schedule, right at a time when everyone is likely to be somewhat tired and cranky from having worked so hard for so many months.

- Debugging tends to be extremely difficult during the final stages of system testing. Note that we distinguish here between *testing* and *debugging:* debugging is the "black art" of discovering *where* a bug is located, after the process of testing has determined that there *is* a bug. When a bug is discovered during the system testing phase of a bottom-up project, it's often extremely difficult to tell which module contains the bug — it could be in any one of the hundreds (or thousands) of modules which have been combined together for the first time. Tracking down the bug is often like looking for a needle in a haystack.
- The requirement for test time usually rises exponentially during the final stages of testing. More specifically, the project manager often finds that he needs large "chunks" of computer time for system testing — perhaps 12 hours of uninterrupted computer time. Since such large amounts of computer time are often difficult to obtain, the project often falls seriously behind schedule.

The second major weakness with the classical project life cycle is its insistence that the phases proceed sequentially from one to the next. There is a

(Continued on In Depth/2)

(Continued from In Depth/1)

natural, human tendency to want this to be so: We want to be able to say that we have *finished* the analysis phase — that it's over and done with, behind us, something that we'll never have to worry about again. Indeed, many organizations formalize this with a ritual known as "freezing the specification" or "freezing the design document."

The only problem with this is that it's completely unrealistic! In particular, the "sequential" approach doesn't allow for the following "real-world" phenomena:

- The person doing the work — the analyst or designer — may have made a mistake and produced a flawed product. Indeed, as human beings, we rarely do a complex job right the first time, but we are very good at making repeated improvements to an imperfect job.
- The person reviewing the work — in particular, the user who reviews the work of the analyst — may have made a mistake.
- During the several months (or years) it takes to develop the system, the user may change his mind about what he wants the system to do.
- During the period it takes to develop the system, other aspects of the user's environment may change — the economy, the competition, the government regulations that affect the user's activities and so forth.
- The person carrying out the work in each phase may not have enough time to finish, but may be unwilling to admit that fact. This is a polite way of saying that, in most complex projects, analysis and design (and system testing too!) finish when you run out of time — not when you *want* them to finish.

Finally, the classical project life cycle tends to make no use of structured design, structured programming, walkthroughs or any of the other modern development techniques. Actually, this is not a major weakness: the classical project life cycle tends to *ignore* the existence of these techniques, which means there is nothing to prevent the project manager from using them!

Unfortunately, many programmers, analysts and first-level project leaders feel that the project life cycle is a statement of policy by top-level management — and if it doesn't say anything about the use of structured programming, they're not obliged to use it!

'Semistructured' Life Cycle

The foregoing comments make it seem as if most DP organizations are

(Continued on In Depth/4)

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(Continued from In Depth/2)

still living in the Dark Ages. Indeed, I may have been somewhat unfair: not *every* organization is using the "classical" project life cycle.

Particularly in the past five years, there has been a growing recognition that techniques like structured design, structured programming and top-down implementation should be "officially" recognized in the project life cycle. This has led to what might be called the "semistructured" project life cycle shown in Figure 2. As you can see, this life cycle differs from the classical variant in two obvious ways:

- It replaces the "bottom-up" sequence of coding, module testing and system testing with top-down implementation. There is also a strong implication that structured programming is used as the method of actually coding the system.
- It replaces "classical" design with *structured* design.

Aside from these obvious differences, there are some subtle points about this modified life cycle. Consider, for example, that top-down implementation means that some coding and testing are taking place in parallel. That certainly represents a major departure from the "sequential" phases we saw in the classical life cycle!

In particular, it can mean *feedback* between the activity of coding and the activity of testing/debugging. When he tests the top-level "skeleton" version of his system, the programmer is likely to be heard to mutter to himself, "Jeez, I had no idea the double-precision FRAMMIS instruction worked *that* way!" Naturally, you can be sure his subsequent use of the double-precision FRAMMIS instruction will be quite different.

Dialogue With Users

Perhaps more important, the use of top-down implementation tempts the implementers (and the analysts, if they haven't abandoned the project by this time!) to talk to the users *after* the specifications have been ceremoniously frozen. It is possible that the user will point out errors or misunderstandings in the specification; he may even express a desire to *change* the specifications. And if the conversation takes place directly between the user and the implementor, it may actually be effected before DP project management knows what is happening.

In short, top-down implementation often provides feedback between the implementation process and the analysis process — though it is specifically not shown in Figure 2 and though the user and the DP project manager might well deny it is taking place!

One final subtle point should be made about the "semistructured" life cycle: a significant part of the work that takes place under the heading of "structured design" is actually an effort to fix up bad specifications! You can see this by looking at a detailed picture of structured design, shown in Figure 3.

Activity 3.1, labeled "Coding Functional Specification," represents something that designers have long had to do: translate a monolithic, ambiguous, redundant, narrative document into a useful, nonprocedural model to serve as the basis for deriving the module hierarchy.

In other words, people practicing structured design have traditionally assumed that they would be given a "classical" specification; consequently, their first job, as they see it, is to transform that specification into a package of data flow diagrams, data dictionaries and process descriptions.

This is a more difficult job than you might imagine. Historically, it was a task carried out in a vacuum — the designers generally had little contact with the analyst who wrote the Victorian novel specification, and he certainly had *no* contact with the user!

Obviously, such a situation is ripe for change. Introducing structured analysis into the picture, as well as extending the idea of feedback between one part of the project and another, creates an entirely different kind of project life cycle. This is the structured project life cycle, which we will discuss next.

Structured Life Cycle

Now that we have seen the classical project life cycle and the "semistructured" project life cycle, we can discuss the *structured* life cycle that will occupy us for the remainder of this discussion. This life cycle is shown in Figure 4.

Here is only the briefest summary of

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Each respondent was asked to subjectively rate the vendors and their products on performance (whether stated equipment specifications have been realized), reliability (uptime vs. downtime), ease of use (amount of time necessary to train new personnel), service (maintenance) and vendor support (such as advance training and program assistance).

A four-point rating scheme was used (1 = poor, 2 = fair, 3 = good, 4 = excellent). The survey results were given as averages of the ratings assigned to each product in each of the five categories.

The Microdata Reality, Basic/Four 400 and System/3 Model 10 and Model 15 were the only small business systems to receive ratings of 3.0 or higher in all five categories.

Taking the average of all five categories, the Microdata Reality topped the field with a score of 3.66 (based on 27 respondents using 55 units). The Reality earned 3.8 in performance, 3.8 in reliability, 4.0 in ease of use, 3.4 in service and 3.3 in support.

Based on nine respondents with nine units, the average for the IBM System/3 Model 15 was 3.6. This system was rated 3.6, 3.8, 3.6, 3.7 and 3.3 in performance, reliability, ease of use, service and support, respectively.

Eight users with 17 Basic/Four 400's gave that system an overall rating of 3.5. In performance, reliability, ease of use, service and support, the system was rated 3.5, 3.4, 3.8, 3.4 and 3.4.

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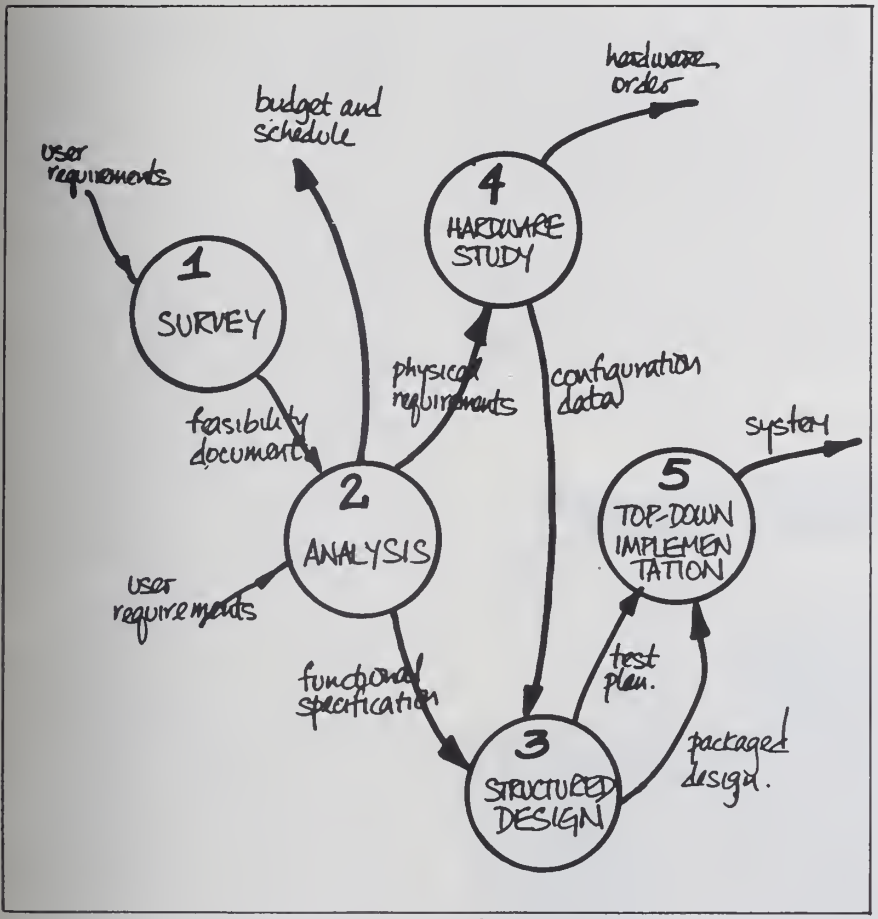

Figure 2. Semistructured Project Life Cycle

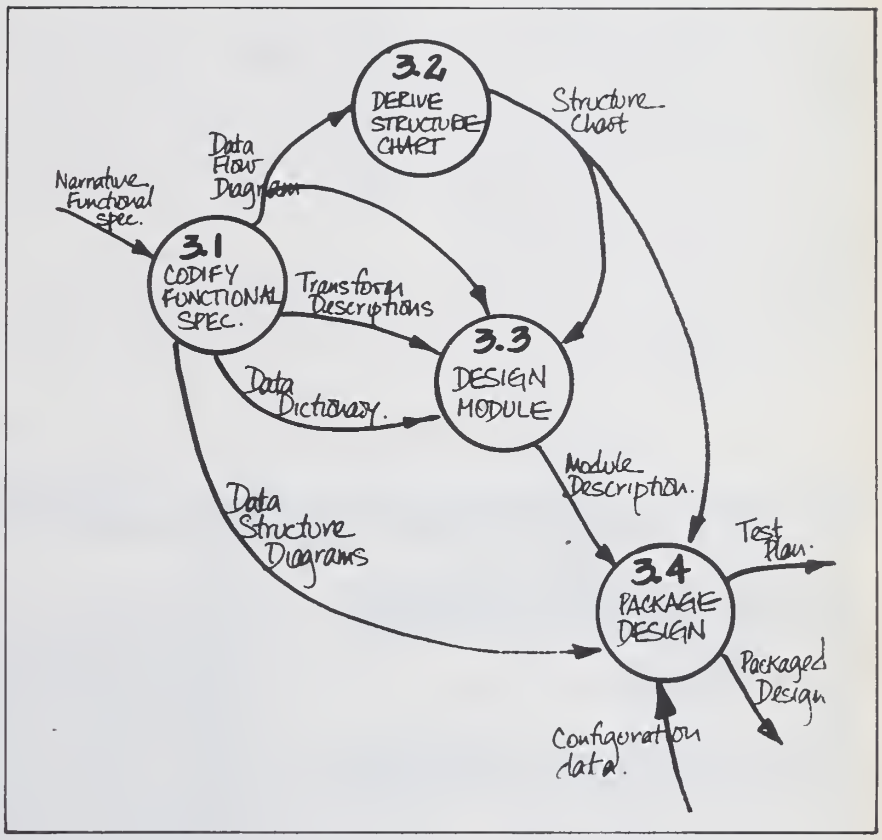

Figure 3. A Closer Look at Structured Design

each of the six activities shown. [The author's forthcoming book devotes an entire chapter to each.]

- *Activity 1: The Survey.* This activity is also known as the "feasibility study" or "initial business study." Typically, it begins when a user requests that one or more portions of his business be automated. The major purposes of the survey are to identify current deficiencies in the user's environment; establish new goals; determine whether it is feasible to automate the business and, if so, suggest some acceptable scenarios; and finally, to prepare a project charter that will be used to guide the remainder of the project.
- *Activity 2: Analysis.* The primary purpose of the analysis activity is to transform its two major inputs — user policy and a project charter — into a structured specification. This involves modeling the user's present environment with data flow diagrams and other tools. Using this as a basis, the user's new environment is modeled in logical terms.
- *Activity 3: Design.* The activity of design is concerned with identifying the proper hierarchy of modules — and the interfaces between those modules — to implement the structured specification. In addition, the activity of design includes a step known as "packaging," in which the design is adjusted or modified to take into account the limitations of the computer hardware being used to implement the system.
- *Activity 4: Implementation.* This activity includes both coding and the integration of modules into a progressively more complete "skeleton" of the ultimate system. Thus, Activity 4 includes both structured programming and top-down implementation.
- *Activity 5: Generate Acceptance Tests.* The structured specification should contain all the necessary information to define an "acceptable" system, from the user's point of view. Thus, once the specification has been generated, work can commence on the activity of generating a set of acceptance test cases from the structured specification.
- *Activity 6: Perform Quality Assurance.* "Quality assurance" is also known as "final testing," or "acceptance testing." This activity requires, as its input, acceptance test data generated in Activity 5 and an integrated system produced by Activity 4.

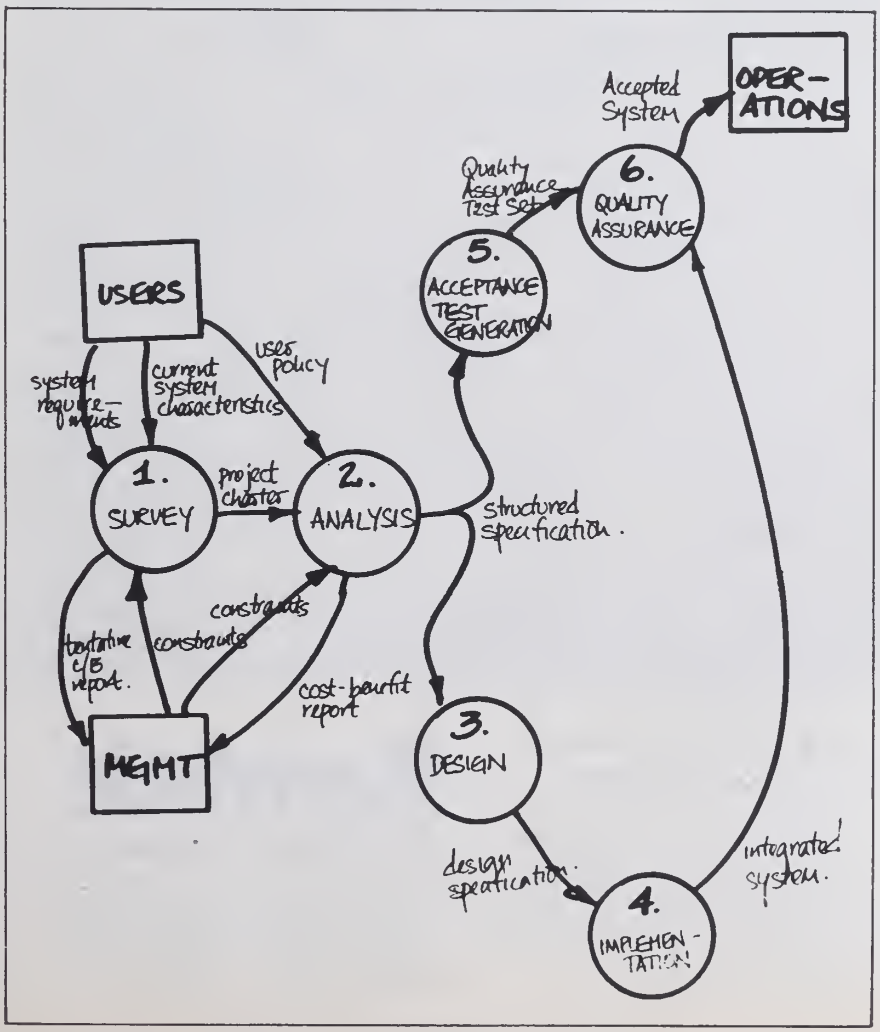

Figure 4. Structured Project Life Cycle

It's important that you view Figure 4 for what it is: a data flow diagram. It is definitely *not* a flowchart; there is no implication that all of Activity N must finish before Activity N+1 commences. On the contrary, there is a strong implication that several activities may be going on in parallel.

In fact, I feel so strongly about this that I've decided to specifically use the word "activity" in the structured project life cycle, instead of the more conventional word "phase." The word "phase" has traditionally implied a particular period of time in a project when one — and only one — activity was going on.

There is something else that must be emphasized about the use of a data flow diagram to depict the project life cycle in Figure 4: A data flow diagram does not show feedback, nor does it show "control." Virtually every one of the activities in Figure 4 can (and usually does) produce information (or knowledge, or wisdom . . .) that can provide suitable modifications to one or more of the preceding activities.

Thus, the activity of design can produce information that may revise some of the cost/benefit decisions that take place in the analysis activity; indeed, knowledge gained in the design activity may even require revising earlier decisions about the basic feasibility of the project.

Indeed, in the most extreme cases, events that take place in any of the activities could cause the entire project to terminate abruptly. Though the input of "management" is shown only for the analysis activity (because analysis is the only activity that requires data from management), it is assumed that

(Continued on In Depth/6)

(Continued from In Depth/5)

management exerts control over all of the activities.

In summary, then, the only thing the diagram tells you is the input(s) required by each activity and the output(s) it produces. The sequence of activities can be implied only to the extent that the presence or absence of data makes it possible for an activity to commence.

Naturally, the diagram shown in Figure 4 does not provide you with enough information to actually manage a project. In fact, each of the activities has half a dozen or more subactivities, and there is much to say about each of them. [Other parts of the author's book explore each project management activity in much more detail.]

Top-Down Implementation

Earlier, I pointed out that the structured project life cycle allowed for more than one activity to be taking place at the same time. Let me put it another way: In the most extreme situation, *all* of the activities in the structured project life cycle could be taking place simultaneously. At the other extreme, the project manager could decide to adopt the "sequential" approach: finishing *all* of one activity before commencing the next one.

I've found that it's useful to have some terminology to help talk about these extremes — as well as all the compromises between the two. A *radical* approach to the structured project life cycle is one in which Activities 1 through 6 take place in parallel from the very beginning of the project that is, one in which coding begins on the first day of the project and analysis and the survey continue until the last day of the project. By contrast, a *conservative* approach to the structured project life cycle is one in which all of Activity N is completed before Activity N+1 begins — that is, no design commences until analysis is utterly finished.

Obviously, no manager in his right mind would adopt either of these two extremes. The key is to recognize that the "radical" and "conservative" extremes defined above are the two endpoints on a whole spectrum of choices — a continuum of compromises between the radical approach and the conservative approach.

Please keep this in mind when you begin your next project: There are an infinite number of choices between the radical and conservative extremes. You might decide to finish 75% of the survey activity, followed by 75% of analysis, followed by 75% of design and so on in order to produce a reasonably complete "skeleton" version of a system. The details could then be refined by a second entire pass through the project life cycle.

Or you might decide to finish *all* of the survey and analysis activities, followed by 50% of the design and 50% of the implementation . . . Or perhaps only 50% of the analysis, followed by as much of the design and implementation as possible. The possibilities are truly endless

Radical or Conservative?

How should you, as a project manager, decide whether to adopt a radical or conservative approach on your next project? Basically, there is no "right" answer. You have to base your decision on the following factors:

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- What are the dangers of making a major technical blunder?

As you can appreciate, none of these are "black-and-white" questions, nor are they the sort of questions for which you can always get a straight answer. For example, you just can't ask the user of the system, in casual conversation, "By the way, how fickle are you feeling today?" On the other hand, you should be able to make your own assessment of the situation — especially if you're a veteran project manager who has dealt with many users and many upper level managers before.

If you judge that you're dealing with a fickle user — one who, out of personality, likes to change his mind once he sees how the system is going to work — then you would probably opt for a more radical approach. The same is also true if you're dealing with an inexperienced user — one who has had very few systems built for him. Why spend two years developing an absolutely perfect set of specifications only to discover later on that the user didn't understand the significance of the specifications?

If, on the other hand, you're dealing with a veteran user who is absolutely sure of what he wants — and if he works in a business area that is stable and unlikely to change radically on a month-to-month basis — you can afford to take a more conservative approach. Of course, there are lots of "in-between" situations: the user may be sure of *some* of the business functions to be performed, but may be somewhat unsure of the kinds of reports and "management information" he would like the system to provide. Or he may be unsure of the impact an on-line system will have on his business, if he is familiar only with batch computer systems.

Pressure for Results

There's a second factor to consider: the pressure to produce immediate tangible results. If, for reasons of politics or other external pressures, you simply must get a system up and running by a specific date, then a somewhat radical approach is necessary. You still run the risk that your system will only be 90% complete when the deadline arrives, but at least it will be a working, 90%-complete skeleton that can be demonstrated and perhaps even put into production. That's generally better than having done all of the analysis, all of the design and all of the coding — but none of the testing.

Of course, all projects are under some pressure for tangible results; it's simply a question of degree. And it's an issue that can be rather dynamic: a project that begins in a low-key fashion with a comfortable schedule can suddenly become high-priority, and the deadline may be advanced six months or a year. One of the advantages of doing the analysis, design, coding and implementation top-down is that one can stop at any point and leave the remaining details for subsequent consideration; meanwhile, the top-level analysis that has been completed can be used to begin the top-level design and so forth.

Yet another factor is the ever-present requirement, in most large organizations, to produce schedules, estimates, budgets and the like. In some organizations, this tends to be done in a fairly informal fashion — typically because the projects are relatively small and management feels that any errors in estimating will have an insignificant impact on the whole organization. In such cases, one can adopt a radical approach, even though any attempts at estimating will have to be "gut-level" guesses.

By contrast, most large projects require relatively detailed estimates of manpower, computer resources and so forth, and they can only be made after a fairly detailed survey, analysis and design have been completed; in other words, the more detailed and accurate your estimates have to be, the more likely you are to follow a conservative approach.

Finally, you should consider the danger of making a major technical blunder. For example, suppose all of your past experience as a project manager has been with batch-oriented IBM

(Continued on In Depth/8)

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(Continued from In Depth/7)

360/30s and now, all of a sudden, you find yourself developing an on-line, real-time, multiprocessing data base management-information system that will process half a million transactions a day from 1,000 terminals scattered around the country.

In such a situation, one of the dangers of a radical approach is discovering, after a large portion of the top-level skeleton system has been implemented, that there has been a major design flaw. You may discover, for example, that in order for your whizbang system to work, some low-level module has to do its job in 19 microseconds — but your programmers suddenly tell you there is no way on earth to code the module that efficiently, not even in assembly language.

To put all of this another way, following the radical approach requires that you pick a "top" to your system relatively early in the game, and there is always the danger of discovering, down toward the bottom, that you picked the wrong top!

On the other hand, if you're building a very familiar kind of system — for example, your 99th payroll system — then you probably have a very good idea of the lay of the land. You probably remember, from your last project, what sort of modules you're going to run into down at the detailed level, and you probably remember very clearly what the top-level structure looked like. In such a case, you may be willing to accept the risks of making a mistake because of the other benefits the radical approach will give you.

In summary, the radical approach is best for thinly disguised R&D efforts; it's good in environments where something absolutely, positively *must* be working on a specific date; and in situations where the user's perception of what he wants the system to do is subject to change.

The conservative approach, on the other hand, tends to be used on the larger projects where massive amounts of money are being spent and where a great deal of careful analysis and design is required to prevent disasters later on.

However, every project is different — every project requires its own special blend of radical and conservative top-down implementation, and you should even be prepared to modify your approach in midstream, if necessary.

Edward Nash Yourdon is president of Yourdon, Inc., the New York-based computer consulting firm he founded in 1974.

Yourdon began his career with Digital Equipment Corp., where he developed the PAL III assembler for the PDP-8, the Fortran Executive for the PDP-6 and the math library for the PDP-5 and PDP-6.

At General Electric Co., he developed an operating system for a large, on-line, virtual memory hospital information system on a modified GE-435 computer.

He was also director of research and development at ELI Computer Time-Sharing, where he developed on-line proprietary packages on the Burroughs Corp. B5500 computer.

In the past 15 years, Yourdon has worked on 19 different types of computer hardware and programmed in assembler and virtually all of the major high-level languages.

He has lectured extensively in the U.S. and abroad and, since 1967, has authorized more than eight books and published extensively in leading trade journals. He is currently completing his first novel dealing with computer crime.

Yourdon has a B.S. degree from MIT.

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Structured Methods

An Analysis Of Current Practices

By Hugh W. Ryan

'In today's data base environment, a structured development methodology must emphasize that the design of data precedes and dictates the design of systems to process the data.'

My objective here is to survey the structured methods in use today and to present a synthesis of the methods that form a technical basis for a system development methodology.

Sufficient methods are available now to define a complete system development methodology. But there are two important keys to building a successful methodology.

First, a structured method ought to solve a problem. One hopes that a structured method will not create problems where none exist but point them out where they do.

Second, if structured methods are to be successful, they must fit people. We cannot expect people to change for a method.

What do I mean by structured methodology? Specifically, it addresses the following:

- Data design — a method to design the data structures a system will use.
- System design — a method to design the system components that will process the data structures of the system.
- Implementation — a method to transform the design to machine-executable format.
- Testing — a method to test the implementation to ensure it meets the user's expectations.
- Maintenance — a method to evolve the implementation to meet future user demands not supported in the current implementation.

In today's data base environment, a structured development methodology must emphasize that the design of data precedes and dictates the design of systems to process the data.

Why are these methods even worth discussing? What are some of the benefits of structured methodology?

Some data is available from which we can identify quantitative benefits. IBM, for one, is maintaining a data base on the effects of structured methods on software development. In addition, my experience indicates considerable quantitative benefits.

For example, in the area of programming effort, the industry average for lines coded, debugged and tested through the system runs about 10 to 15 lines per day in a non-structured environment; in our structured environment we have found we can code, debug and test 20 to 40 lines per day.

In the area of program bugs, we have been running about one to five bugs per hundred statements of code in a non-structured environment; in a structured environment, by contrast, we're finding one to five bugs per *thousand* statements.

Design effort, too, has been reduced. Precise comparisons are hard to make, but it is very rare for a program to take more than one to four weeks to design in a structured environment. Such efforts can take two to three months in a nonstructured environment.

Finally, in a structured environment we have been able to reduce our maintenance staff by a factor of three to one. So, where one person maintained one of our early non-structured bridges, we found in a structured environment that the same person could maintain three later bridges.

The qualitative benefits are perhaps as significant as the quantitative ones, particularly in an organization trying to build and maintain a staff of data processing professionals. I have observed two important qualitative benefits.

First, the methodology gives the data administration group, the systems designers and the programmers a better definition of their job. System designers make fewer comments like "I might as well be coding it." The data administrator no longer views his job as watching for synonyms. He is responsible for a set of tasks that result in the design of the data structures the system must have to support its functions. And the programmer is no longer a coder but the craftsman who gives the system the final form.

The maintenance staff becomes the general practitioners of the methodology, for they must understand and practice all aspects of the methodology in order to keep the system in production and evolving towards future user needs.

Second, with better definition of roles comes increased job satisfaction. Simply because people better understand what they should be doing in their jobs, they can evaluate their personal performance and be aware of and satisfied with the quality of their work.

Indeed, one of the most striking aspects of a shop using structured methodology is the frequent use of the word "quality." From the data base designer to the programmer, the staff recognizes that structured methodology means quality in the systems it develops.

Historical Perspective

The concept of a method to develop systems began in the mid '60s with works by Edsgar W. Dijkstra and C.A.R. Hoare. Their works, in a sense, tried to explain how they developed (wrote) programs. Their thoughts and approaches were widely used in compiler software development over the next several years.

In 1969, the North Atlantic Treaty Organization held a conference on software reliability at which the set of ideas on what constituted structured methods, as they were understood at that time, were presented.

Then in 1971, published results on the use of structured programming were provided based on a project at the *New York Times*. The results looked very promising. As a result, structured programming was accepted by DP organizations and promoted by the academic environment.

However, a hint of problems with structured programming developed rather quickly. My own experience indicated that often a change to a structured program required pages of changes, rather than a few isolated changes to lines of code.

It became clear to me that a strict use of structured programming constructs could result in a poor program from the standpoint of a flexibility and maintenance.

At about the time discontent emerged on structured programming, articles and books began to appear on structured design. Specifically, an article on structured design by Constantine, Myers and Stevens was published in the *IBM Systems Journal* (Volume 13-2, 1974).

Structured design was a partial solution to structured programming problems. I found a well-structured design reduced or eliminated many of them.

(Continued on In Depth/10)

(Continued from In Depth/9)

In addition, maintenance and debugging problems were considerably reduced. This is not too surprising since the structured design techniques were developed in response to debugging and maintenance problems in IBM's OS/360.

Function-driven structured design emphasized designing the program structure based on *isolation of program functions* and *minimal sharing of data.* As I have noted, the technique was developed in response to OS/360 experience, where a considerable body of literature exists on what are appropriate functions for an operating system. However, when the method was taken to an applications environment, problems developed.

The basic objective of the design technique was to isolate program modules on isolating program functions. Particularly, new designers then asked what a program function was. In a typical accounts payable environment, there is no "body of literature" on what functions are appropriate for accounts payable. Thus, there was no list of functions that would answer the question, "What is a function?" Further, there was no working definition of program function from which one could easily determine if an item was a function.

My personal experience in teaching the function-driven approach to new designers indicated that the lack of a definition was a major block to them. The block was overcome only by continuous assistance until the designers developed an intuitive definition of function. The method did not fit people and thus was a problem.

Data-Driven Design

At about this time, I read M.A. Jackson's *Principles of Program Design.* My interpretation of Jackson was that program structure should be based on the data structure processed by the program. Jackson took the other concern of structured design, minimal sharing of data, and used it as a basis for design.

The practical implication, however, was that with data-structured design, one no longer had to say "design based on functions." It was not necessary to define what a function was.

Using a new methodology, however, is like opening Pandora's box. Our next question was, "Where did the data structures come from?"

Structured Analysis

The answer to that question led to the methodology of structured analysis, which has many definitions. I view structured analysis as those procedures and techniques used to define the data structures required by applications.

The objective of structured analysis, then, is to identify the data required by a system — and then to design the structures. These data structures then become the key input to the structured design activity.

I. Data Design

The first method I want to examine is data design. I define it as the distinct, conscious activity of designing the data structures a system will process.

The activity of designing data structures has become much more significant with data base technology. In a sequential file environment, one has very few options; the primary alternatives are the keys of records on the file and implied relationship by physical proximity.

Data base technology, however, allows us, within limits, to design data structures with many different entry points and numerous techniques to imply relationships. Also with the use of a data base, the data structure we design dictates the DP systems we design.

Stated another way, a structured methodology for data base technology requires that we design the data before the DP system. Data design dictates the system.

Here's my definition of data design: setting up procedures and guidelines by which the entities of an application, relationships between the entities and attributes of the entities are identified.

Thus, data design addresses the problem of formulating the data structures required by a processing system.

Problems in Design

Let me note a couple of important points. There is a view that data should be designed at the highest corporate level. But my experience has

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been that from a practical standpoint, it is difficult to come up with a workable data model for an entire organization. This is not to say that the process is not desirable, only that the result is usually less than was hoped.

The reason for the difficulty revolves around the nature of applications which are prone to exceptions to every rule. Such exceptions must be accounted for in a workable data model, but noting and accommodating such exceptions is very difficult in a data model at an organizationwide level.

In addition, workable data models at the organizationwide level are difficult to develop because of the physical limitations of today's hardware and data base management systems (DBMS). As a result, the organization's data model is often very different from the final physical design, particularly as the application exceptions and DBMS limitations are accounted for in the physical design.

In essence, the technique of developing organization data models seems to conflict with the basic nature of applications, current hardware and software and the people who must develop them.

We can see an indication of this problem in the Codasyl decision to allow multiple schemata instead of a single organizationwide schema.

Inputs, Outputs

What are the inputs and outputs to data design?

The inputs are a description of the business functions and the data required by the functions (see Figure 1). As I noted, I am discussing business functions for a given application, not an entire organization.

The outputs are what I have called the logical data base and logical views. The field has a great many names for the logical data base, including conceptual model and schemata.

By logical data base I mean a configuration of entities and relations between entities that supports the business functions of the application. By entities I mean the objects that are of interest in the application.

Logical views are prepared by the function and are the paths through entities and data collected on the paths,in performing the function. The logical views are a key input to subsequent systems design. They are also subject to iterative refinement during the system design activity.

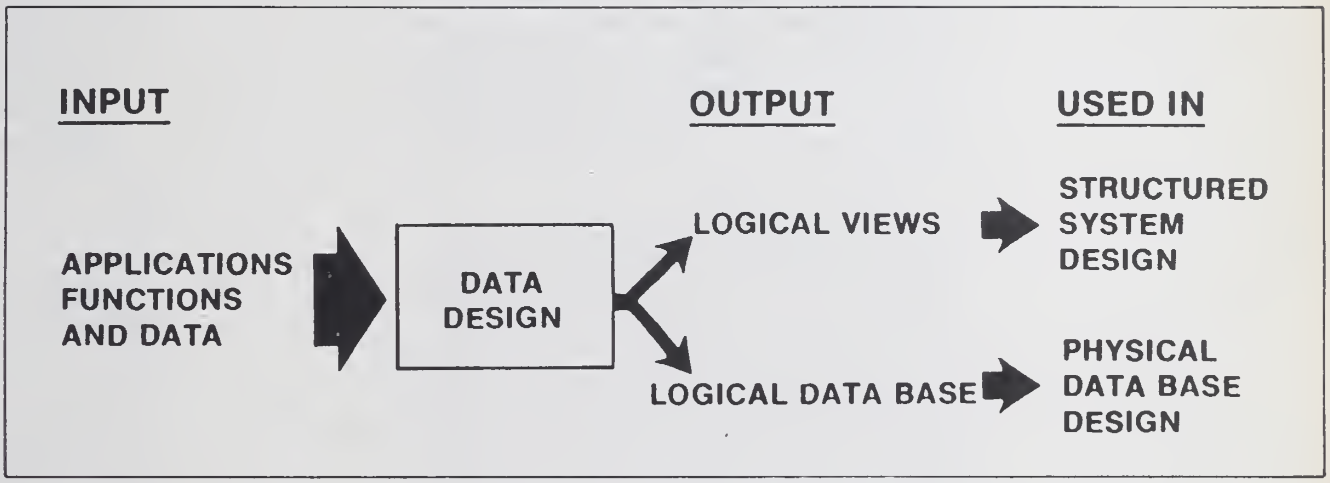

Figure 1. Data Design Inputs/Outputs

Building Logical Model

Now what is the process by which business functions and required data are transformed to a logical model?

There are a great many different processes. The one I have presented is one I have been working with most recently. It may be described as a top-down data design method — it identifies entities (the objects of interest in the application) and relationships between entities before it defines the precise attributes of each entity. Attributes are the data that describes the entity.

Bottom-up data design techniques, on the other hand, encourage describing entities and the attributes identifying the entities before identifying relationships between entities.

I worked with a bottom-up method for about two years and found it unsuitable. It often tended to make extraordinary clerical demands, produced serious design errors because of human error and represented a very serious problem when a change had to be made. The problem revolved around the number of forms that had to be created and maintained.

The top-down data design method has fewer of these problems, I believe, because it takes advantage of some qualities unique to human beings.

Here are the steps in top-down data design:

1. The business functions of an application must be identified. For example, a travel agency could have a reservation application. The reservation application could support the business function of billing (see Figure 2).

2. The data required by each function and the procedure by which the data is collected should be identified. For example, the billing function could require data on price per tour.

One proceeds to identify all the functions of the application and the data the functions require.

3. The entities of the application should be identified. As I have noted, entities are the objects of interest in the application. A good way to check if something is an entity is to ask an end user if he knows what it is. If he can identify and talk about it, you have an entity.

As an example, the reservation application could require a customer entity to support the billing function.

4. Relationships between entities should be defined. This step is completed based on the data requirements of the functions within the application. For example, we might note that to do billing for a customer, we need the

(Continued on In Depth/14)

STEP	EXAMPLE
Identify Application Functions	Reservations Will Support Billing
Identify Data Required by Function	Billing Will Require Price of Tour
Identify Segments	Billing Will Require Tour and Customer Segments
Identify Relations Between Segments	Billing Will Use Customer and Tour Segments
Group Data Into Segments	The Tour-ID Segment Will Contain Price of Tour

Figure 2. Data Design

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Concurrent Dual Emulation – The 600/35, 600/45 and 600/55 systems communicate concurrently over two different lines, making it easier to schedule work.

3270 Pass-Through – An extended mode of the 3270 emulation, Pass-Through permits the Nixdorf 600 Series systems to selectively satisfy local inquiries by accessing local files or a mainframe computer, without operator intervention.

Local File Processing

High Level Language – All Nixdorf 600 Series system applications are programmed in Editor II, an interactive COBOL-like programming language, containing the operational capabilities of COBOL – data manipulation, arithmetic, logic and input/output – in addition to information entry, update, inquiry and retrieval.

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(Continued from In Depth/11)

tours the customer is going on. Thus, we would say the billing function requires a relation between "tour" and "customer" entities.

5. Attributes are placed in entities. The attributes are data which describe the entity. As an example, the "tour" entity requires the attribute of "price per tour."

Here's how the process might work in a real-world example. Assume we are doing a survey of the reservation function for a travel agency. One of our activities is to prepare a list, by tour, of customers on a tour. This list is then used to prepare billing statements. Thus, we have identified the function — billing — within the reservation application. Further, we have identified the data and flow of data within the function.

For the sake of brevity, we'll assume this is the only function we consider. From this function, we can create a logical output structure. The logical output structure helps to isolate entities by noting occurrences and levels of data. Experience indicates that very often an occuring item implies an entity.

From the logical output structures, we prepare a logical data base. This is a diagram illustrating entities and relations between entities. In addition, one notes how the functions use the entities and relationships.

Next, the data attributes are associated with the entity. At this point, three points should be noted.

First, very often the analyst will go directly from the inventory of functions to a data model. The tendency to do so should not be discouraged. In my experience, these sudden insights are very often correct and are, in all cases, a means to begin to crystallize thinking on what the "final" answer is to be.

In the past, I have found methodologies to be too insistent on "following the steps." I believe we are much better advised to take full advantage of the human faculties, and where the analyst can use his insight and understanding to provide the correct answer, we ought to take advantage of it.

Second, to err is human, and so the method must compensate for this problem. Therefore, when insight is used to define the logical data base design, it is essential that the design be tested. Data design can be tested by taking each function and showing that the "created" logical data base design supports all the data requirements of the function.

Finally, as I have noted, this is a logical data base design. It is taken into the system design process and physical data base design. These two design processes should be kept in very close contact. Very often the system design must create many of the relationships of the logical data base rather than the DBMS. It is essential that these processes communicate.

It would be a serious mistake to assume that the logical data base design will be precisely reflected in the physical data base design. Where a physical data base design must compromise a logical data base design, the system design must compensate for the compromises.

It appears that where a relationship exists among data, we have two alternatives. One is to maintain the relation via the DBMS. When, for reasons of efficiency or practicality, the relationship cannot be maintained within and by the data, the relationship must be created via system processing by extracts, sort/merges, edits and so forth. We could state: A *lack* of data structure creates a need for system design.

Efficiency Concerns

We often hear the question, "Will a structured design be inefficient?" The typical answer is, "Worry about efficiency after implementation."

I believe, given today's hardware and software, the response is valid for only the system design. For data structure design, efficiency is now and will continue to be a primary concern in the final data structure design.

Further, since data design dramatically affects system design, the impact of efficiency is felt in system design. For this reason, *the concern with efficiency should be directed to data design, not system design.*

II. Systems Design

The second area I want to discuss in structured development methodology is systems design.

A systems design includes proce-

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dures to design systems and programs, to evaluate the quality of design and to package the design physically for execution on the machine.

What are the inputs and outputs of this systems design method? There are two key inputs (see Figure 3).

First are the logical views from the data design activity. Note that this implies systems design cannot really proceed until data design activity is just about completed. As I have noted, the systems design process can usually proceed in parallel with the physical data base design, but very good communication must be maintained between the groups.

The second input is an understanding of the business functions including how they support the application and how they "work" currently.

Coming out of the systems design method are both:

- Systems design — the definition of on-line and batch components and the definitions of the programs within the on-line and batch components.
- Program design — the definition of the internal structure and relations between program components.

This output then becomes the input to program implementation and testing.

Five-Step Process

Five major steps are involved in systems design (see Figure 4).

First, the systems architecture must be identified. In this step, there are three phases: One partitions the system between man and machine. Then, within the machine component, one identifies on-line and batch components. Finally, one identifies the structure of the on-line and batch components.

My experience has indicated that identification of the man/machine interface must be based on knowledge of what has been done in the past.

Some people feel knowledge of past efforts should be ignored as it may limit future efforts. I have been involved in several cases where this has been done, and the result was never a success.

My own feeling is that there is a vast difference between ignoring what has been done before and building on it. I recommend the latter.

Identifying batch and on-line components requires a knowledge of the applications and current capabilities of the target DBMS and on-line system. Once again, this phase is human-dependent.

.Standard Systems Architecture

Identifying the structure of the batch and on-line components can be based in part on guidelines. These guidelines identify what I call *standard systems architectures.* Standard system architectures are all variations on the systems design guideline: Validate precedes update, update precedes extraction and extraction precedes reporting.

The variations are created by considering the implications of such choices as batch and on-line processing, data base and sequential files and embedded and stand-alone extraction.

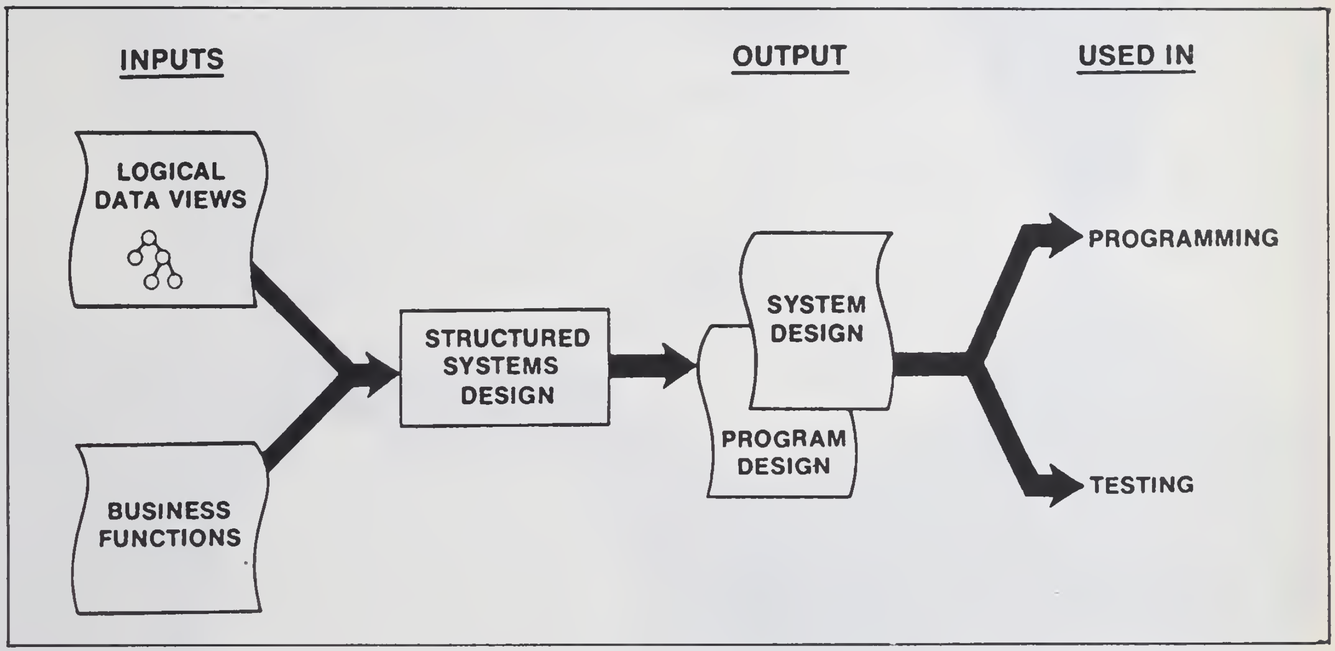

Figure 3. Structured Design Inputs/Outputs

The designer uses these standard systems architectures to structure his design at the systems level. This, then, leaves the problem of structuring program internals.

Once again, standards can be defined for identifying the high levels of the program structure. I call these standards *generic program architecture.* The basic idea of these generic program designs is that there is a separate program routine for each transaction processed. I call such routines *transaction processors.*

Beyond an architecture that identifies a program routine per transaction, there is little that can be said on a general basis. So the second step is to continue the design based on a structured systems design method.

Structured Systems Design

There are what are claimed to be two distinct schools of structured systems design. One school is the *function-driven approach.* This approach advocates creating a highly modular program based on a separation of functions, such as the lack of a concise definition of function and the absence of function lists in application areas.

The other approach is the *data-driven approach.* This approach says to create a program structure based on the data structures processed by the program. The major shortcoming of data structured methods is in resolution of data structure clashes. Such clashes arise as a result of input and output structures being dissimilar. Such clashes are, in fact, very common in typical designs.

I feel a synthesis of the two methods is most effective. The data-driven method can be used to structure the transaction processor mentioned above. This can be done based on the logical views and business functions available from the data design step. Then, typically, structure clashes are resolved based on analyst insight, and the design is structured based on functional design considerations.

The structure clash is a case where a

(Continued on In Depth/18)

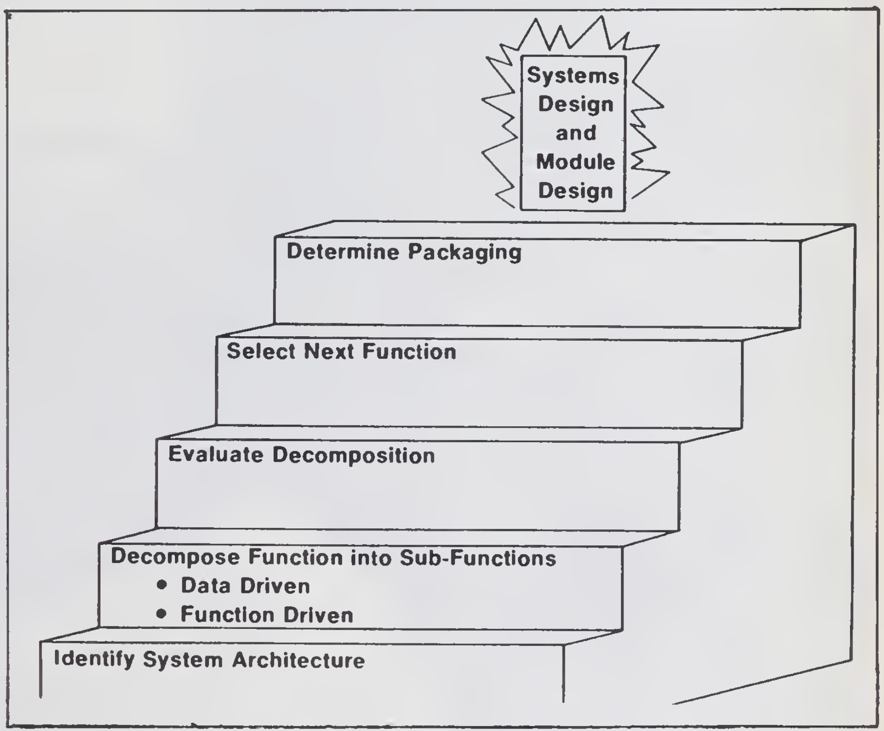
Systems Design and Module Design
Determine Packaging
Select Next Function
Evaluate Decomposition
Decompose Function into Sub-Functions
• Data Driven
• Function Driven
Identify System Architecture

Figure 4. Steps in Structured Systems Design

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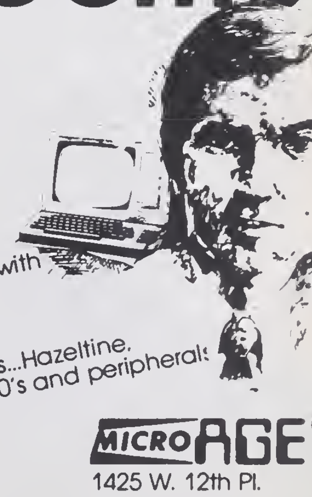

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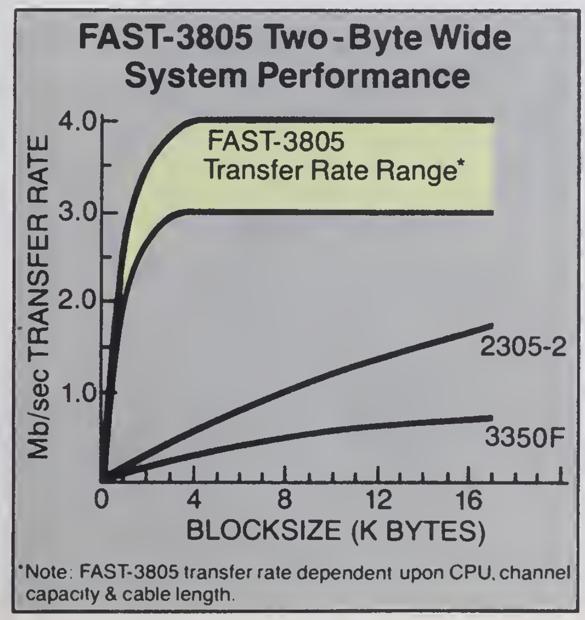

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(Continued from In Depth/15)

method cannot solve a problem; it cannot resolve the structure clash. The method can, however, isolate the problem of the clash, and then it falls to the analyst to proceed by resolving the clash, as I have noted, using his insight. He will employ function-driven design to structure the design, based on the resolution.

The third step is to evaluate the quality of the design. When using the data-driven method, the evaluation is primarily to check that the program structure resembles the data structure. This check may be rather subtle in some cases, such as when interpreting a programming language as a data structure and designing a compiler based on the interpretation.

In the case of the function-driven methodology, the evaluation of the quality of the design has a rather extensive set of guidelines regarding high module strength and minimal data coupling. The application of the guidelines tends to become intuitive after a while.

Select Next Function

The fourth step is to select the next function for design. With experience, one develops a "feel" for selecting the next function for design. However, initially, designers frequently find themselves having a problem with this step.

My approach is to work on the design of a given transaction until I "feel" there is little of which I am uncertain. Then I move to an area where there are mysteries as to how to proceed. Obviously, in this phase there is little method and much magic.

Packaging

The fifth step of the structured design process is physical packaging. Up until this point, a logical hierarchy of program functions based on data structure and functional considerations has been created.

Physical packaging addresses how this logical hierarchy will be transformed into a physical hierarchy of CALLs, PERFORMs and in-line code. This step tends to receive little discussion, but it is quite important both from the standpoint of quality of design and project management.

The quality of the design is influenced very significantly by the packaging consideration. The packaging consideration directly dictates what the final package looks like.

And no matter what quality of thought went into the logical design, the design will always be evaluated on its final physical format. A physical format that reflects a high degree of precise thought on how to create the package inevitably adds to the final package quality.

The point of impact on project management is perhaps less obvious, but just as significant. Physical packaging creates the program units — stand-alone compatible units — of a system. And for now, the best measure of project progress is the program unit. So physical packaging, in effect, identifies what the milestones for project management will be.

To the extent that these milestones are discrete, controllable units making significant contributions to project completion, project management will be able to evaluate progress on the project in terms of relevant, meaningful steps.

Finally, out of all these steps we have a system and program design package deliverable to programmers for the implementation effort.

It is worthwhile to summarize some of the above points:

- The initial definition of man/machine interfaces is not a method but more in the nature of magic. We build on human experience to define where man ends and the machine work begins.
- We can identify some standards to help structure the architecture of batch and on-line components. Such a method is based on the approach that the validate function precedes the update function, which precedes the extract function, which precedes the reporting function.

Within each function, we can define a standard for the design of programs which reflect seperate program routines *for each transaction.* Such standards I have called *standard system architectures and generic program design*, respectively.

- The next phase, typically, is detailed design effort. The design effort is most effective, I believe, if it is based

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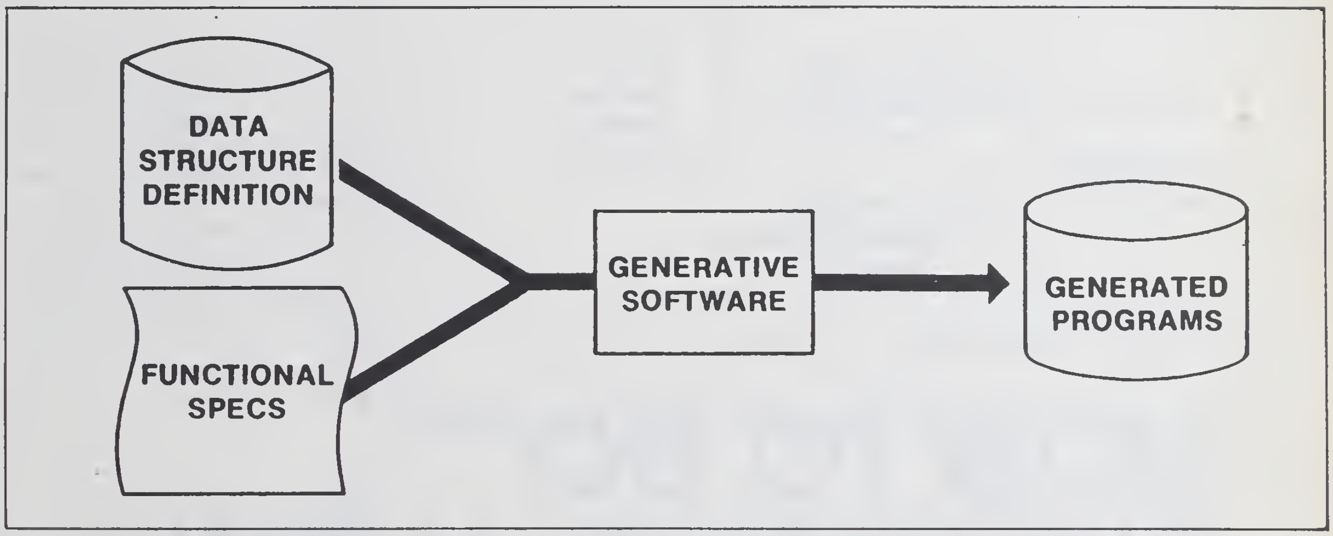

Figure 6. Software Generation

on a synthesis of data-driven and function-driven methods. The data-driven method is used to do initial structuring of transaction processors, and function-driven methods are used to resolve structure clashes.

- The effectiveness of the data-driven approach is totally dependent on the preceding data design effort.
- Physical packaging is a very significant step in that it directly influences the final appearance of the product and the milestones by which project management evaluates progress.

III. Implementation

The third area to be examined is implementation methods. In this step, we take the general design and transform it into machine-executable instructions.

The areas I include in structured implementation are:

- Structured programming. This includes guidelines and heuristics for writing the code of a system based on the system design documentation.
- Generation of programs. This addresses machine generation of programs based on designer specifications.

The inputs to structured programming implementation are the design specifications. Another input, which is difficult to diagram, is the interest and concern of the programmer in creating a product of quality. The output is a program ready for testing.

Structured Programming

Here are the major steps of structured programming (see Figure 5):

First, the programmer must review, understand and validate the design. I believe the three activities are very important.

Review may seem obvious, but in my experience, it is typically done only superficially.

A design is rarely understood before coding begins. With earlier design techniques (detail flowcharts and narratives), this was understandable. However, with the newer design techniques, it is not unreasonable to expect a programmer to understand a design before coding.

As the programmer completes his design review, I look for one final activity. The activity is validation delete. By the time I complete a design, I know what I think it does too well to be able to effectively validate it. However, the programmer, in developing an understanding of the design, should develop at least as good an understanding of the design as I have.

In addition, it is greatly to his advantage, in terms of total effort, to check that the design is valid before coding it. Expecting him to validate the design is only logical. This is an example of a method fitting the human being.

After the programmer has understood and validated the design, he then begins to design the major components of the program. I have found the most effective approach is to have the programmer write pseudocode. The pseudocode seems to be an excellent transition tool to take the hierarchical diagrams of a design to the sequential format of a program listing, while ensuring that the structure of the design is not lost. In doing this, it is important that coding standards for pseudocode be defined. The standards should address how to implement the standard constructs of the pseudocode.

It is worthwhile to note here that the programmer is not, in this step, coding the program in pseudocode; he is designing the program's internal structure. There is a very great difference, between the two.

The next step is to have a walkthrough of the pseudocode. One of the values of the pseudocode is that it provides an excellent tool for analyst review. It gives the analyst the opportunity to review program structure and logic to ensure it is as the analyst expected it, while not forcing him to be involved in all the technical aspects of current compiler language shortcomings.

The next step is to actually code the program. The programmer translates the pseudocode into the appropriate programming language. It is very interesting to watch the programmers rely on the pseudocode to help them create the program code. Once again, it is important to define standards and guidelines on how pseudocode is to be translated to program language constructs.

It is worthwhile to point out here that the above does not describe the programmer as a coder. I see the same relation between analyst and programmer as we find between an engineer and a machinist. In such a relation, the designer attempts to create a well-structured, coherent design, but it is the programmer who creates the final product. Only a programmer interested and concerned in creating a quality product can do so. A coder cannot be such a programmer.

Generation of Programs

The second major aspect of implementation is implementation via programs generated from computer software based on design-level specifications (see Figure 6).

We have heard a great deal about generation of programs. We have heard less about successes.

Most generative efforts have emphasized taking an analyst-prepared, ''free-form'' description of what should be done and somehow generating the programs to do required functions from the specifications.

The difficulty in such an approach is that the generative software has to be

(Continued on In Depth/20)

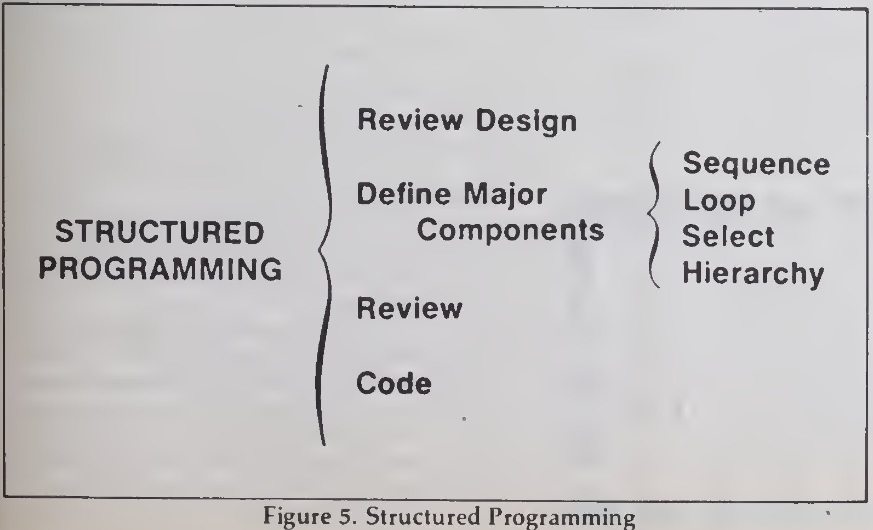

Figure 5. Structured Programming

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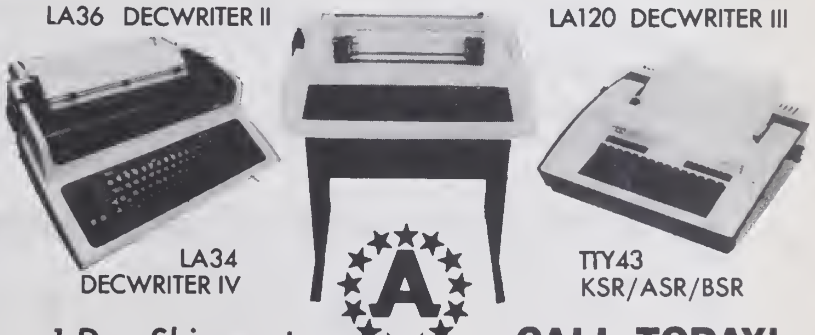

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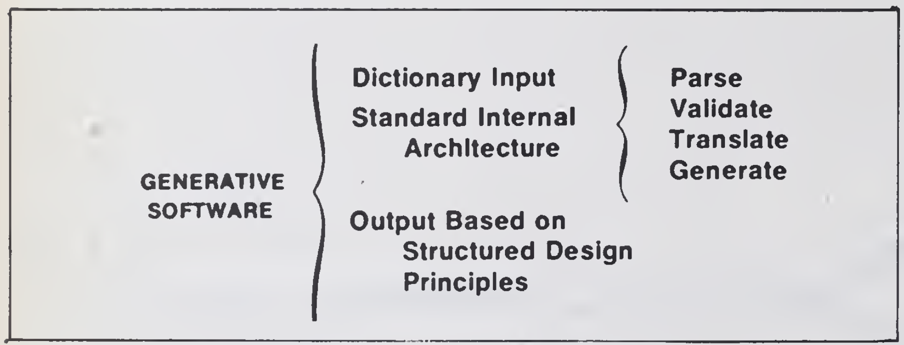
GENERATIVE SOFTWARE
Dictionary Input
Standard Internal Architecture
Parse
Validate
Translate
Generate
Output Based on Structured Design Principles

Figure 7. Generative Software

(Continued from In Depth/19)

able to conceptualize the design from the functional requirements specifications and generate programs based on conceptualization. However, the computer does not deal in terms of concepts; it deals with data structures and the manipulation of data structures.

The key to software generation, then, is to allow the human to conceptualize the requirements and create data structures appropriate for the requirements. Once this is done, however, the data descriptions can be put in machine-readable format.

In addition, we can describe functional requirements in machine-readable language. Then generative software *can* generate programs to manipulate the data structures based on the data descriptions and functional specifications.

What does this generative software look like?

First, its input is a data dictionary containing data structures and functional descriptions of manipulations required for the data structures (see Figure 7).

In addition, the generative software I have been involved with has had a standard internal architecture which includes the phases of:

- Parse — collecting data from the data dictionary.
- Validate — which checks that the collected data is valid and meaningful.
- Translate — a structural phase which ensures the data is in a format suitable for generation.
- Generate — the final phase that actually generates an appropriate source or machine language.

As implied above, the entire basis for this type of generative software is that data structure implies program structure and that standard system architectures and generic program architecture can be established for a wide variety of conditions. The system design principles discussed earlier are key to this effort.

Let's recap some of the points made above:

- Generative software can work on the above principles, can generate validation and extract and edit programs.
- Experience with the software indicates it is *absolutely* essential that the user understand precisely what data structures the generative software is intended to deal with. This is a two-sided effort in which the software developer carefully describes the design intent of the software and the user relates the descriptions of his requirements to ensure there is a match. Pushing generative software beyond its capabilities always results in disappointment.

The key to generative software lies in human definition of appropriate data structures. This task will be little aided by software. Great progress is feasible in defining more and more standard system architectures for a wide range of requirements.

IV. Testing Design

The fourth major area is testing design. Here we address the goals of testing, how to test and who should test.

Testing design defines guidelines and procedures to ensure a system provides the functions expected by the user.

Testing does not have to meet documented requirements or show that a system is correct. It is almost impossible to get requirements documented with sufficient clarity and precision as to be unambiguous. Because of this, testing to documented requirements specifications is almost always a disap-

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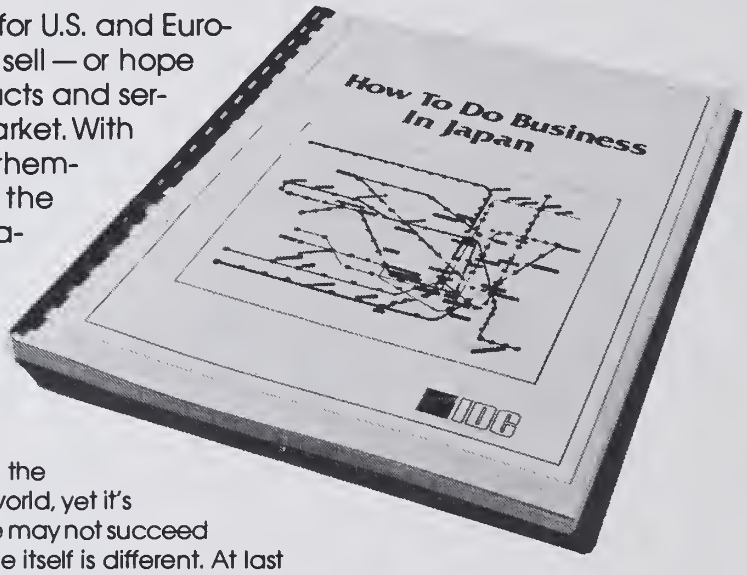

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pointment.

Further, a system is right only when it does what a user expects. Testing design should address ensuring the system performs to user expectations.

There are some caveats in the area of testing. First, the method is still evolving. As a result, it lacks unity and definition. In discussing it, then, we must address points of interest rather than a unified systematic method.

Conversely, given the time we spend in testing, it has one of the greatest potentials for future development.

The inputs to structured testing are the business functions the application is to support and the system design documentation (see Figure 8).

The outputs include:

- A test schedule giving the sequence in which testing is to be done.
- A test plan identifying the conditions which are to be tested.
- The predetermined test results, giving the significant results which are expected from each test condition.

There is not yet a unified approach to testing design, but ongoing work in several areas may lead to one.

Test to The Code

There are two approaches to defining test cases. One is to test to the code. Requiring every branch to be executed three times is an example of such a technique.

There are some problems in such a method. First, often a great deal of time is spent setting up conditions which could never occur just to see that the code executes as expected. Often too much time is spent testing impossible events to the detriment of testing feasible events. The other drawback is that testing to the code does not show if the code correctly implements the design.

Further, testing the code, by definition, fails to consider if the design is correct and experience shows that software errors are more frequently the result of design errors, not implementation errors.

Black Box Approach

The second basis for defining test cases is to treat the software as a black box. In this approach, one defines test cases based on the functions the programs are expected to support with little or no concern being directed to program internals.

The black box approach is very effective in establishing whether a program meets the functions expected of it. However, it is very sensitive to the human error of failing to identify all functions.

The best approach seems to be a synthesis of the two techniques. In the synthesis, test cases for the program unit are defined by function by the analyst, and test cases to the code are defined by the programmer with collaboration between the analyst and programmer to ensure complete test case definition.

At high levels in the system structure, testing should increasingly emphasize viewing the system as a black box and test and functional requirements.

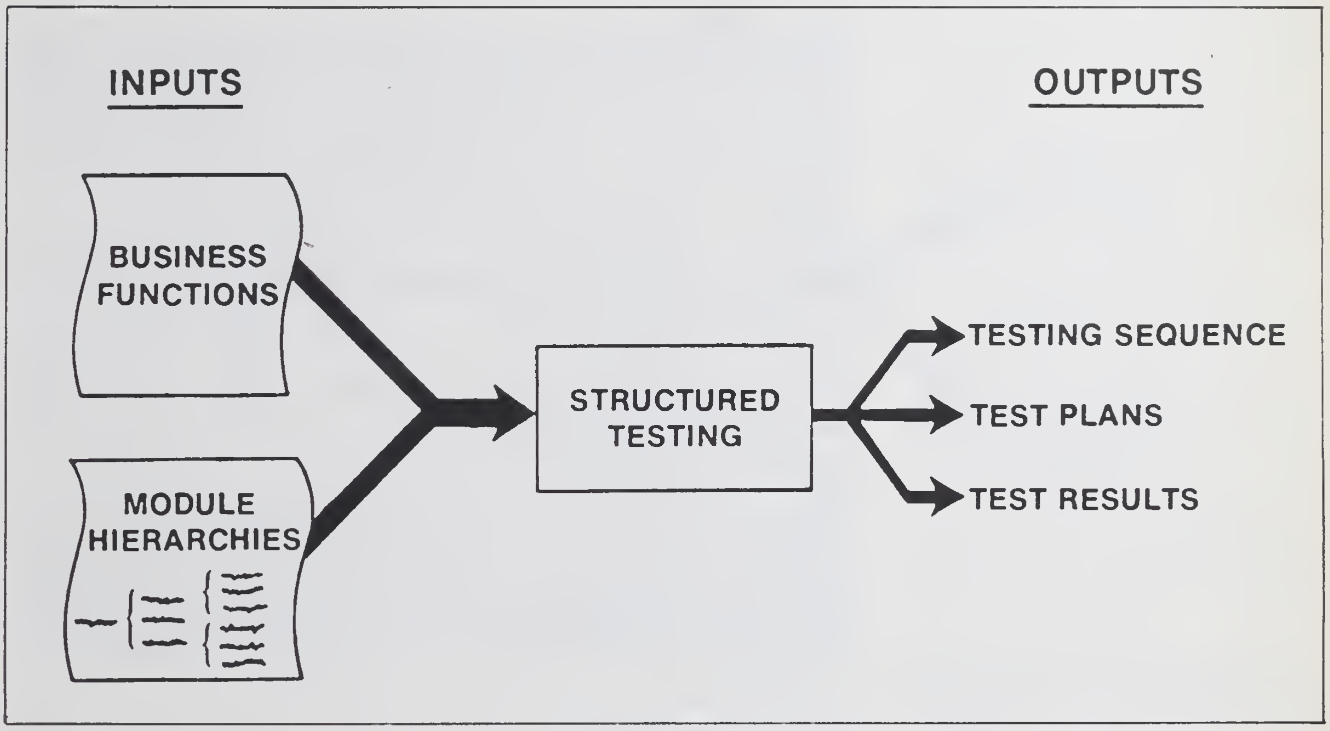

Figure 8. Structured Testing Inputs/Outputs

Experience indicates it is difficult to get designers to test the system as a black box. It is also difficult to get a system designer to approach testing in what may be called a destructive manner.

Destructive testing may be viewed as testing whose goal is to find problems, rather than show no problems exist. As a result, we are seeing increasing use of the testing team approach.

In this approach, the testing team is composed of both technical and end-user personnel and their stated objective is to show the system does not work.

There are many problems with such an approach:

- Experience shows that an effective technical test person is almost always a very strong designer. As a result, getting such a talent out of the development group into testing is often a major problem.
- Many designers prefer the creative, constructive activity of designing to what appears to be the destructive activity of testing. Thus, motivating such people, once out of the design, is difficult.
- If testing teams report to the project manager, there is often a political problem, for, in effect, they are to find problems in a system for which their supervisor is responsible. Conversely, most project managers are very reluctant to give up control of the testing team.
- Finally, end users on the testing team, who are not experienced in DP, often become very concerned. The concern arises in early testing, when it is very easy to break the system. Such concern may be communicated to other end users and result in long-term resistance to the system.

Walkthroughs, have mainly been used in program implementation, but they are also very effective at the systems test level with test teams. They are very effective in obtaining user involvement and definition of user expectations.

Vertical Tests

The final area I want to discuss is what I have called *vertical testing*. Vertical testing addresses how one goes about defining the testing sequence.

The two best-known techniques for defining testing sequence are top-down and bottom-up testing.

In top-down testing, one tests one level of the program hierarchy at a time. Stubs are created for levels immediately below the level being tested. The stubs "simulate" the behavior of the next level down.

Top-down testing has two significant problems. One is that very often the stubs become very complex and re-

(Continued on In Depth/22)

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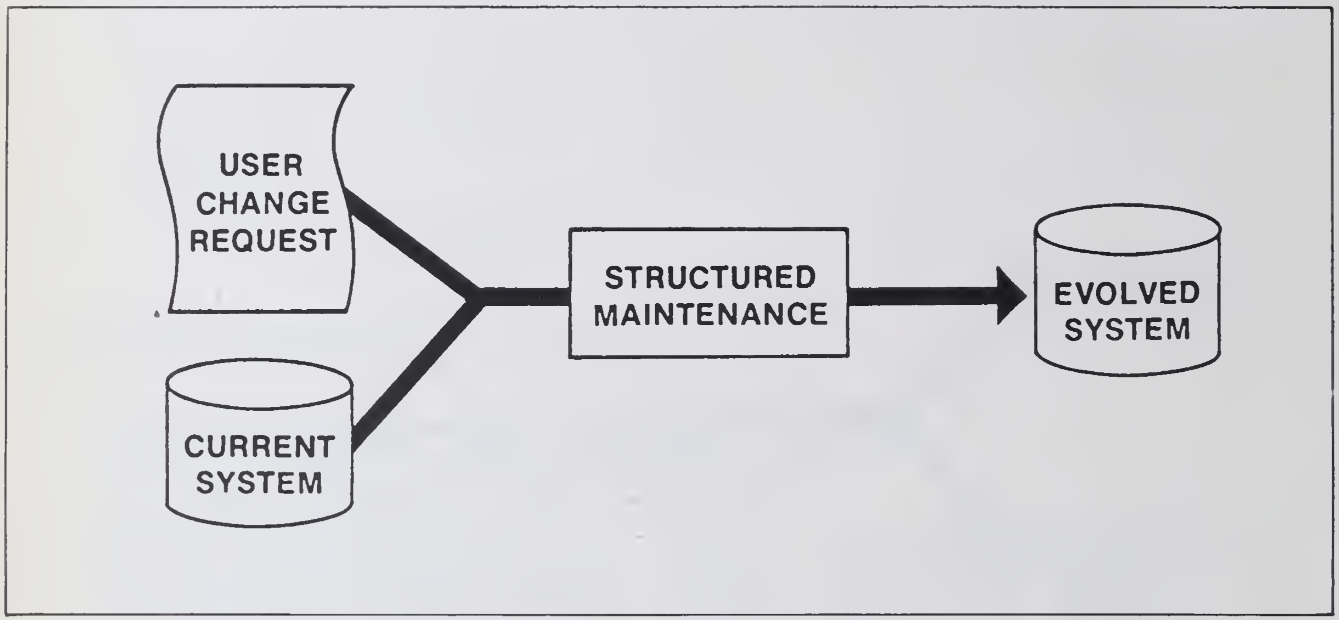

Figure 9. Structured Maintenance

(Continued from In Depth/21)

quire debugging. The second, less noted problem is that very often the functions at a given level of a hierarchy have no logical relation. As a result, testing problems (program aborts, data area destruction) is one function may slow testing in another, unrelated function.

In bottom-up testing, all program units are exercised on a stand-alone basis, then merged to create the program and program testing begins.

Bottom-up testing has many drawbacks. First, it is not uncommon to completely test a program unit on a stand-alone basis and, on integration, find what the program unit does is basically wrong. Then the whole testing process begins again.

Another problem is that the integration testing begins rather late. As a result, it tends to be rushed.

Compounding the rush is the difficulty of defining a controllable test sequence when all the program units are suddenly integrated. There is a tendency in this case to say, "Let's run a lot of stuff through and see if it works." This is ill-structured testing at its worst.

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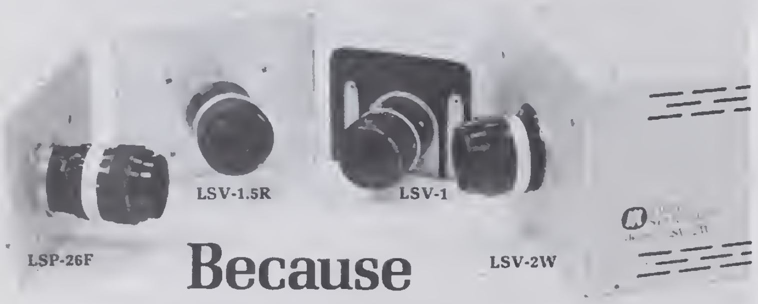

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Vertical testing is a synthesis of top-down and bottom-up testing. It is an attempt to gain the benefits of both techniques while avoiding some of the drawbacks.

In vertical testing, the highest levels of the system and programs are tested in a top-down manner. The top-down testing stops, however, as soon as the stubs to be prepared must do anything more than set return codes and/or a few data fields.

In parallel with this top-down testing, bottom-up or stand-alone testing is done on terminal routines, routines that do not call any other routines. These are typically I/O routines and utility routines.

The next phase of vertical testing is to integrate and test a vertical branch of the program hierarchy. When the vertical branch is tested, one integrates the lowest subbranch to the right of the branch being tested and begins testing again.

There are several benefits to vertical testing. These include the following:

- There is minimal effort spent on preparation of stubs.
- Very often the vertical branch has some logical function. As a result, very early testing produces meaningful results.
- Inherent in the method is early testing of program unit interfaces and appropriateness of function.
- The technique tends to reduce the amount of test data preparation. Very often, one vertical branch, as a part of its natural processing, prepares input for some subsequent vertical branch.

The primary problem I have encountered with vertical testing is that it imposes very heavy demands on project management. Management must ensure that many units are available on time or else the vertical integration scheme quickly fails.

V. Maintenance

Many large corporations today spend more than 80% of the DP dollar on maintenance. Anything that can reduce maintenance or make it more palatable would have significant benefits. Structured maintenance is a new area which I believe has great potential for the future.

Paradoxically, it was the difficulties encountered in testing and maintenance that ushered in most of the structured methods, yet the areas of testing and maintenance have received the least attention on a formal basis.

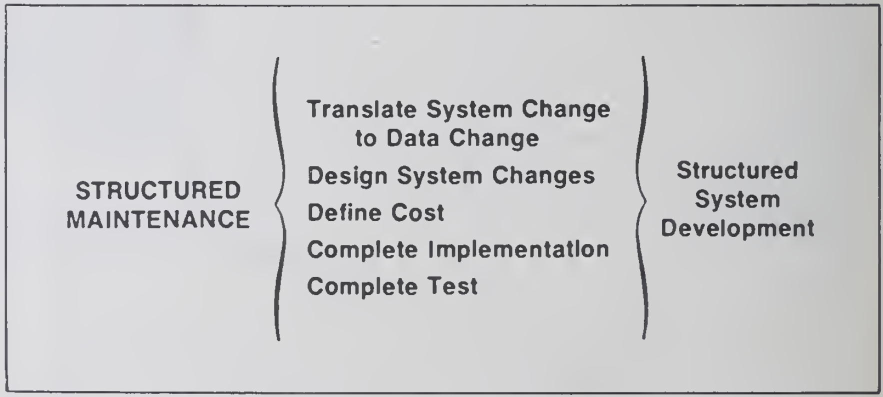

Figure 10. Maintenance

Structured maintenance deals with procedures and guidelines to achieve system change or evolution through definition of data structure change to accommodate the system change requirement.

The inputs to structured maintenance are user change requests and the current system, including data base design and system design (see Figure 9).

The output from structured maintenance is an evolved system reflecting the user change request.

There are five key technical steps in structured maintenance (see Figure 10).

First, the user request must be translated to required data structure changes. This activity is very different from the typical maintenance approach of determining where to set switches. Instead, the maintenance activity is to identify what changes to data structures should be made to ac-

(Continued on In Depth/24)

“NCR’s VRX is the best software product I’ve seen,” says Stan Trawick of Bassett-Walker.

Stan Trawick (right) is computer systems manager of Bassett-Walker Knitting Co., Inc., Martinsville, Va. Joe Kepley is an NCR district manager.

TRAWICK:
When we went to VRX (NCR’s Virtual Resource Executive), our work-scheduling problems simply disappeared. Now, we run what we want to run when we want to run it. It is just a simple statement, but it makes a fantastic difference in the computer room. VRX is the best software product I’ve seen.

NCR’s JOE KEPLEY:
VRX really takes the pressure off your operator. It will actually run up to 35 jobs at one time. It dynamically allocates memory and other resources. It oversees virtual memory swapping. It watches for memory thrashing and program loops. And adjusts the job mix to eliminate them, if they occur.

TRAWICK:
And VRX gives us Online Program Development, a feature that has increased our programming efficiency tremendously. Recently, I received the printout produced by a modified program just two hours after I asked for the programming change. That’s fast. Before VRX, we’d have needed at least a day.

NCR’s KEPLEY:
TRAN-PRO (NCR’s transaction processing software) has helped your programmers, too.

TRAWICK:
That’s an understatement. When we decided we needed a sophisticated communications system, our programming staff had no communications background. So we were looking at a period of intensive programmer education. And that would have been followed by another lengthy period devoted to the development of basic communications software. With TRAN-PRO, our staff was able to move through these two stages rapidly and get directly into the application programming.

NCR’s KEPLEY:
So you were able to sidestep the communications complications as you moved directly into application programming. Because TRAN-PRO handled the communications for you.

TRAWICK:
Yes. And it is all part of a larger picture. Our competitive edge in the sportswear industry is our ability to respond quickly to our customers. Because we are online, we can answer a customer’s inquiry instantaneously. And we can ship an order within 24 hours of receipt. VRX and TRAN-PRO are real aids.

In the NCR office nearest you, there is an account manager like Joe Kepley who specializes in your industry and knows NCR systems, including VRX and TRAN-PRO. Learn how an NCR system can help you. Phone him at the local NCR office. Or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.

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(Continued from In Depth/22)

commodate the user change.

The second step is to then identify the program functions which currently process the data structures. These program functions are reviewed and system changes identified.

The third step is to determine the cost of the change. One of the benefits of this method is that it quickly indicates significant costly changes. The indication is seen when the appropriate data structures to accommodate the change are very different from the current data structures.

Using the guideline that data structure dictates program structure, the implication of a significant data structure change is that the program is due for major change because of the user request. Too often in the past, the major change has been attempted via more switches.

Assuming the cost is acceptable, the fourth step is to do the implementation and the fifth is to test the results.

I think it is worthwhile to note that structured maintenance goes through all the steps of the structured system development methodology we have been discussing. My own experience is that maintenance personnel are one of the unused resources for the design process.

Unfortunately, they are too often relegated to the full-time maintenance of old systems while less experienced people develop new systems. Such new systems often repeat many of the maintenance problems of the current systems because of inexperience of the analyst. This repetition of errors seems to me to be a major problem in DP.

What Lies Ahead?

What can we expect to see in the future?

First, in structured testing, there should be a more formal definition of the method. I would expect that the method would incorporate the use of testing designers, just as today we recognize data base and system designers. In addition, the literature is beginning to note the use of complexity measures to evaluate testability and the adequacy of testing.

I would hope the future holds a lessening of steps via simplification and/or customization of steps.

In line with automation, we should see increasing generation of programs and further control structures defined for a wider variety of situations.

Finally, we can expect to see greater emphasis on structured maintenance, perhaps to the point where there is very little development and very extensive maintenance.

Hugh W. Ryan is manager of technical services at Arthur Andersen & Co. in Chicago.

Ryan joined the firm in 1971, working with applications in the steel and insurance industries. For the last five years, he has concentrated on system software and software and data base design methodology.

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State-of-the-Art Facility

Cuny Houses 'Imaginative' DP Center

By Connie Winkler
CW Staff

NEW YORK — The City University of New York (Cuny) computer center is an imaginative one:

- A life-support systems monitoring system recently warned of a building water pressure pump malfunction 15 minutes before it would normally have been detected. The monitoring system is part of the IBM System/7 card access security system.
- Two IBM 370/168s were parlayed into an Amdahl Corp. 470V/6-II and an IBM 3033 without spending an additional nickel.
- Communications lines to as many as three of the 20 colleges can be down and the center can still maintain the high-speed links with dial backup.
- A Tesdata Systems Corp. minicomputer monitors hardware and on floppy disks provides a month's data on the performance of the entire system.
- Special arrangements allow computer science students to use the system, and encourage them to do so in off-peak hours.
- Cuny counselors are evaluating IBM's Discover career guidance system and looking at putting a local job and skills data base on the system. "This really reaches the heart of what the university is about — we are preparing people to go out into the real world," according to Ira H. Fuchs, the computer center's executive director.
- As many as 300 users are on the system at one time, and there are 2,000 to 3,000 potential users.
- Cuny maintains a surprisingly pleasant working environment at the center, which is decorated in oranges and purples.

Consolidation Effort

Cuny's two 370/168s were purchased in 1972 when the university chose to consolidate its administrative computing operations, according to Fuchs, who has been the director since then.

The consolidation was economically advantageous, but it has also turned out to be a good decision today because of the growth of communications capabilities.

"The centralized approach has been workable for us because we are geographically compact," Fuchs said. The 20 campuses that make up the largest urban university are no more than 10 miles from the main computer center in mid-Manhattan.

There are now 56 telephone links to the campuses and about 700 low-speed terminals and 56 RJE stations. Although many of

(Continued on Page 58)

Technology, Economics, Users Seen Driving DDP Expansion

By a CW Staff Writer

SILVER SPRING, Md. — Technology, economics and increasing user sophistication are the driving forces behind the burgeoning distributed data processing (DDP) environment, according to Raymond Jozwik, senior manager with Arthur Young & Co. in Washington, D.C.

Addressing a session of the recent Data Processing Management Association Educational Foundation's National Symposium on Computer Enhancement, Jozwik said that the following trends are responsible for the proliferation: faster and less expensive hardware, the increasing cost of software relative to the cost of hardware, the maturity of the minicomputer software industry and the sophistication of users who realize the computer is a tool.

For several years, IC circuit density has been doubling each year, the consulting firm manager pointed out. At the same time, the mean time between failure (MTBF) has undergone a significant change — from about 600 hours in 1960 to an expected 100,000 by 1980. Moreover, circuitry is becoming self-checking, and fail-soft capabilities — such as those offered by the Tandem Corp. systems — have become more commonplace.

This has meant that computers — particularly, some of the so-called "superminicomputers" such as the Digital Equipment Corp. VAX 11/780 — now deliver approximately 20,000 units of work per hour vs. only one unit per dollar back in 1960.

Major Concerns

Jozwik identified five major concerns that affect moves toward distributed processing. These are increasing personnel costs, the desire for higher reliability coupled with an increased dependence on computer applications for business functions, the demand for increased processing power, the desire for control over one's own processing capability and high communication and central processing costs.

There are three principal issues in distributed systems, the consultant noted. These are system effectiveness issues, information management issues and general management issues. Unlike some other speakers addressing the DDP concerns voiced by management and relevant to users, Jozwik did not get into the political concerns.

System effectiveness issues include lack of backup during extended downtime, duplication of system development efforts, the high cost of conversion, inefficiencies in system usage and the inability to meet growth in needs.

User Guidelines

However, there are guidelines that can ease these issues. For example, to meet the redundancy issue, users can specify compatible hardware at backup locations. The duplication concern can be met by segregating the user community by type of application, and the growth problem can be ameliorated by specifying an upwardly compatible family of systems.

Similarly, there are guidelines for the information management issues. For example, security and privacy considerations can be handled by developing internal policies and procedures. To meet the challenge of nonstandard information interchange protocols, users have two choices: either specify one or more communications-compatible suppliers or minimize required communication between different locations.

The key point is that standardization is necessary for distributed processing, Jozwik suggested.

Users should be careful to recognize the differing roles of various types of hardware in distributed processing systems. For example, conventional mainframes should be used for highly complex operations and transactions, for large data bases or as hosts. On the other end of the scale, intelligent terminals can act as source collection devices or graphic terminals for data entry or word processing.

In between these two extremes, microcomputers can act as process controllers, network controllers or terminal device controllers. Clearly, as one goes up the scale — from intelligent terminals, to microcomputers, to minis, to mainframes — each higher level of hardware can subsume the functions of the preceding levels.

WP, DP Trends Projected For 'Information Czar' of 1980s

By a CW Staff Writer

SILVER SPRING, Md. — Information systems in the 1980s — including word processing (WP), data processing and other information handling systems — will present many opportunities for an "information czar." And it will be the DP manager who will step into this role, according to Frank Kline of International Data Corp. (IDC).

Kline, director of market planning for the Waltham, Mass.-based market research firm, pointed out that the technology is here today to fill many or most of our information handling needs. "The question is, can providers provide [technology] in a way that users can use it?" he said at a recent session of the Data Processing Management Association Educational Foundation's National Symposium on Computer Enhancement.

However, there is a caveat. The state of the art in software is approximately seven to eight years behind that of hardware. Moreover, there is a significant shortfall of software engineers, further complicated by a shortage of personnel qualified to train users in system use, he noted.

Projecting into 1983, Kline saw three significant trends in office information systems and the information industry: electronic mail, teleconferencing and the merger of DP and WP.

The growth of electronic mail, he predicted, will be driven by its speed, its cost-effectiveness and the new, multipurpose equipment coming onto the market. "The key factor, of course, is economics."

Electronic teleconferencing can be divided into three areas: video and audio teleconferencing and computer conferencing.

Computer conferencing may have future application in the business community, but it still has some problems to overcome. For example, it is used more by people who feel comfortable with computers than by the general business community.

Also, large companies often clearly separate the WP and DP functions, he continued. These are often managed by different people and are not related. His own company, IDC, is an example, he told an amused audience.

Kline identified three future technologies that he said will be effective in changing the office information processing picture. However, these will occur five, 10, perhaps even more years into the future.

These are voice output, voice input and optical character recognition (OCR) input of handwritten copy. Voice output as a cost-effective method is not likely to appear in the next two to five years; the other two technologies are still somewhat off.

Benson-Varian Unveils MPU-Controlled Plotter

MOUNTAIN VIEW, Calif. — Benson-Varian, Inc., has introduced the Model 5342 sheet-fed, high-resolution, microprocessor-controlled drum plotter.

The Model 5342 plots on any medium in any format from "A" to "E." The drawing medium does not have to cover the drum and does not require sprocket holes. Media are mounted to the drum using an auto-adhesive strip, a spokesman explained.

The 5342 provides resolution of .5 mil with standard push-button selectable displacement units of 1 mil, 2 mil or 4 mil.

The 5342 is said to offer fast pen-up displacement, 31.5 in./sec along each axis in all printing configurations. Basic pen-down speed is 44.5 in./sec diagonal.

The microprocessor intelligence of the 5342 offers as a standard feature linear and circular interpolation plus a 128 character set.

Operating features of the 5342 include a dc servo motor with integral photoencoder feedback, rack-and-pinion drum drive for maximum accuracy, automatic step-spreading for line smoothness, a 4-pen head carriage and a rigid, lightweight drum. The pen carriage accepts all conventional writing instruments, the spokesman claimed.

The 5342 has a built-in RS-232C interface, which provides a variety of on-line connections without the need for a special extra cost controller.

The Model 5342 is priced at $33,000, the firm said from 385 Ravendale Drive, Mountain View, Calif. 94043.

Cuny DP Imaginative

(Continued from Page 57)

the campuses still have administrative computers as large as an IBM 370/145, and although some applications such as registration are still to be put on the computer, separate campus data centers would now be unfeasible with rapidly increasing personnel costs, Fuchs explained.

State-of-the-Art Facility

The centralized site has allowed Cuny to remain a state-of-the-art facility — Fuchs calls it one of the best academic computing facilities in the country, and certainly one of the largest.

The two 168s had been purchased through capital programs prior to New York City's financial woes. By 1978, the center needed more computer power and so — in spite of the education bureaucracy — competitively sold one of the 168s with 4M bytes of memory to a leasing company. The Amdahl 470V/6-II with 6M bytes was purchased with the proceeds.

By February of this year, however, Cuny wanted more power and chose to sell the second 168 the same way. This time IBM won the bid and Cuny got a 3033 with 6M bytes of memory. The center now has 60% more horsepower, Fuchs said. Today Cuny also leases a 3031.

Currently the university is upgrading all the CPUs to IBM's JES3, for which Cuny was a beta test site.

With this finagling and with the center's $2.5 million operating budget, the center has managed "to stay ahead of the tidal wave," Fuchs said.

Challenging Environment

The state-of-the art facility is a key reason why the 50 DP staffers like Cuny. "Employees see around them people they consider the best in the field — it's an exciting and challenging environment," Fuchs said.

"The challenge is that each time we put on a new system it has to be multiplied times the 20 campuses," Fuchs explained. "A system with 10 terminals per campus suddenly means 200 terminals."

Finding good people is Fuchs' biggest problem. "We have uniformly high standards in terms of people — very, very selective," Fuchs said. "The system is so complex we require the people with the greatest potential."

He uses the university itself to find people, tapping student interns for operations from the two-year community college computer science programs.

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CIF Seen No Miracle for Thrift Institutions . . .

DENVER — Using an on-line central information file (CIF) system, a thrift institution can reduce its mailing and operational costs, improve its cross-selling performance, enhance customer services and provide management with better, more accurate information, according to Fred A. Shultz, vice-president of DP for People's Savings Association in Toledo, Ohio.

However, CIF also can cause service deterioration, user department dissatisfaction and work overloads for the thrift's DP department, he cautioned.

Shultz outlined CIF's potential benefits and pitfalls in a presentation at Nucon '79, the Federation of NCR users' ninth annual international convention held here recently. The vice-president entitled his presentation: "Central Information File: A Miracle Drug or A Terminal Disease?"

"The answer to that $64,000 question is neither," Shultz concluded. "CIF can be either, but it all depends upon how the system is implemented. At People's Savings, we have found CIF to be as close to a miracle drug as one can get in DP.

"But that is because we looked at all the potential disadvantages in advance and found ways to reduce or eliminate them. There is work involved. If we had not put in the time necessary for planning and careful implementation, I might well be saying today that CIF is a disease."

At People's Savings, the NCR Corp. Savings and Loan Central Name and Address File (CNAF) system is run in conjunction with an NCR Class on-line financial software package on an NCR Criterion 8550 mainframe. Though the savings and loan began implementation of the NCR CNAF software in November 1977, it did not have all applications up and running on-line until early 1979.

The $350 million thrift institution has seven branches in addition to its main office. Its customer base includes approximately 60,000 savings account customers and about 15,000 mortgage and loan account customers.

Initial Analysis

Before committing to CIF or any new system, an institution first should examine and catalog all hoped-for benefits and potential disadvantages, Shultz advised. Then, it should outline the steps necessary to reach the potential benefits and to eliminate or at least minimize undesirable side effects.

The institution then should proceed only if a calculation of the costs associated with the system — such as software, people, computer resources and training — and a similar tabulation of savings indicate that the system can be cost-justified, he added.

Shultz pointed out that this exercise can effect the final balance sheet substantially, since an institution that is forewarned of costly, potential hazards can sidestep them with careful planning.

In People's Savings' initial analysis of the NCR CNAF system, many hoped-for benefits were defined. These included:

- Simplifying and thereby improving the maintenance of name and address information.
- Elimination of duplicate mailings to the same address. Possibilities in this category included combination mailings of periodic savings statements, interest checks, loan and mortgage notices and special promotional pieces.
- Combined savings checks that cover total interest payments and permanent withdrawal orders.
- Establishing an individual's total relationship to People's Savings with minimal effort and providing new account representatives, loan officers, tellers and others with easy access to the information.
- An ability to offer customers the option of having their mail sent automatically to permanent or temporary alternative addresses. This feature is especially attractive to retirees who may live several months of the year in a warmer climate.
- Simplifying third-party payments.
- Reducing the disk allocation needed to contain customer name and address information.
- Making savings, loan, mortgage and overall portfolio

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*IDC OEM Markets, a business opportunities briefing 1979.

. . . But Proper Planning Can Minimize Pitfalls

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Potential Pitfalls

Shultz then outlined CIF's potential disadvantages. "I want to stress that these are *potential* disadvantages. Some can even be turned into advantages if one goes into the system without any blinders on."

Among the potential pitfalls, he listed the following:

- Possible slowdown of the on-line system with the addition of another set of files, a master and directory.
- An increase in the number of programs that must be maintained in the DP library, such as off-line update, purging, restructuring and transaction-recording programs.
- Failure to obtain good name and address reports unless all current reports and user forms that include name and address information are modified.
- Absence of an automatic ability to consolidate and match up like name and address records.
- Absence of CNAF access modules that can be mapped into a users' report or customers' form modules.
- No guarantee of an automatic reduction in the number of pieces a thrift institution has to mail.

Double-Edged Impact

Shultz next outlined measures People's Savings has taken to successfully maximize hoped-for benefits and minimize disadvantages. In many instances, actions taken by the thrift institution to ward off potential problems have in turn enhanced system benefits, he said.

Shultz added that the reverse situation has occurred, too, and attempts to maximize advantages have simultaneously served as preventive medicine for possible system ills. He described the Scrub subsystem developed by People's Savings as a good example of a tool with double-edged impact. This subsystem is the one major enhancement that the institution felt it needed to make the NCR CNAF system a success.

Linking Necessary

"In order to reduce overall disk storage requirements, computerized name and address linking is essential," Shultz said. "If a thrift institution simply converts its files on a one-to-one basis by moving account information from savings, mortgage and loan files into a CNAF file, there is no benefit.

"We strongly felt a need for a subsystem that automatically linked accounts with like name, address and Social Security numbers on an ongoing basis, not simply at the time of conversion.

"Using our Scrub subsystem, we have reduced disk space requirements for name and address records by 28%," he continued. "Scrub also gives our new account representatives more flexibility."

Five Programs

The Scrub subsystem is made up of five programs. Each time it is run, the system also restructures the CNA file and updates alpha locator information.

"We don't attempt to run Scrub daily or even weekly," said Shultz. "The system takes a lot of time — about six hours — because it does a lot of things.

"However, it is completely parameter-driven, and the extract files it produces can be put to tape or held on disk until we have time to complete the run."

One product of Scrub is a nonmatched report, which lists all accounts with identical Social Security numbers that the system could not match because of name or address discrepancies, Shultz said.

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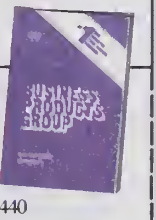

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Keeps Pace With Swelling Work Load

Conversion Shores Up Gulf Coast County

GALVESTON, Texas — Galveston County, on the upper Texas Gulf Coast just a few miles south of Houston, is a place where well-preserved 19th century architecture may be found just a few miles from some of the most modern petrochemical plants and oil refineries in the world.

Its county government, however, is completely modern. The county began using computers in the early 1960s and is currently converting to a new Honeywell, Inc. Series 60 Level 64 system valued at about $1 million.

"We've found that the more people use the computer, the more uses they find for it," according to Al Cogbill, Galveston County DP manager. "In recent years, our work load has increased steadily as more and more county departments have asked us to devise programs for them."

Cogbill said the system was initially intended to handle the county tax department's appraisals of property for taxing purposes. But now the system, in addition to appraisals, assessments and tax collections, also handles other record-keeping and administrative chores ranging from payroll records to keeping up with court-ordered child support payments. It even picks jurors for the county courts.

"We've written a lot of the programs ourselves, and a Honeywell has provided a lot of support during our initial conversion to the new system," Cogbill said.

The Level 64 system replaced Honeywell Series 2000 mainframe purchased by the county in 1968. "The Honeywell Level 64 has about double the capability of the earlier model," Cogbill said. "The memory is two to three times as large, the speed is about double, the disk storage capability is about 50% higher and the tapes are five to six times as fast."

He said the new system also permits greater ease of maintenance, changes and programming.

Galveston County is planning further improvements in its computer system with the addition of a transaction-driven system (TDS) by the end of this year. The TDS will be used initially to make updates in tax data base records to reflect changes in land ownership.

Tax Records

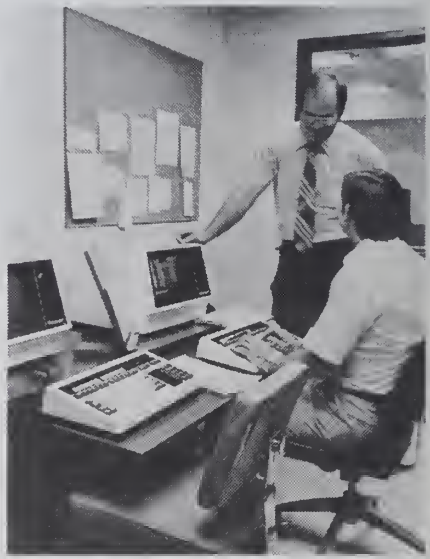
The DP manager said the Honeywell system was chosen primarily to handle the county's appraisals and assessments of taxes on property in the county. "The property tax appraisal and assessment are the most important functions, because they enable us to constantly update our tax records and keep our collections current," he said.

Galveston County has some 140,000 individual tax accounts, including residential, industrial, commercial and resort property.

"The district clerk is expanding his system to include indexing and bookkeeping operations, and we will begin indexing the county clerk within a year," Cogbill said.

DP Forefront

Galveston County was among the first in Texas to begin using computers for keeping county records. The county used outside contractors for computer services beginning in the early 1960s, and it purchased its first system in 1968.



Al Cogbill, Galveston County DP manager (standing), keeps up with the ever-expanding DP needs of the county with the Honeywell, Inc. Level 64 system.

The purchase of the Level 64 system also helped Galveston County to meet a new requirement imposed by the state legislature. The legislature last spring voted to require a single tax appraisal district in each county to begin operation no later than 1982.

Under the current system, Texas' 254 counties have overlapping taxing authority with municipalities, school districts, flood control districts and other government entities within the counties. In most instances, each government entity makes its appraisals of property for taxes independently.

The new law is designed to ensure uniform property tax assessments within each county.

"We don't know at this point whether we will be designated the central agency for Galveston County, but if so, the system will help us to be ready for the additional work load," Cogbill said.

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We know how to build compatible computers smaller, cooler, more energy-efficient and less expensive than their IBM counterparts. And National Semiconductor is right there with the committed backing to make all our plans come true.

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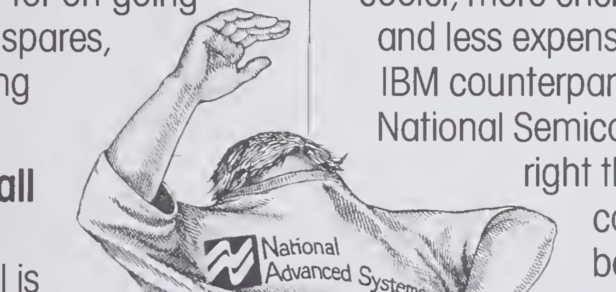
* Datapro Research Corporation's annual survey/1979.



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Keeps Redundant System Backup

Bank Puts Transaction Eggs in 'Dual' Baskets

FLINT, Mich. — Rather than put all its transaction eggs in one basket, a billion-dollar bank here continues to use dual redundant systems to process all on-line transactions during the day and the brunt of processing required after their 34 branches close.

Leonard H. Chevalier, vice-president and DP director for the Citizens Commercial & Savings Bank, said that "management chose to meet expanding service requirements with selection of the Magnuson Systems Corp. M80/4 and to continue redundant system backup, with the IBM 370/145 serving as the backup machine."

The bank's DP environment, under DOS CICS/VS, includes the M80/4 with 2M bytes of memory and five channels, the IBM 370/145 with 1M byte of memory, 30 Control Data Corp. disk drives, eight IBM 3420 Model 7 tape drives, an IBM 3704 teleprocessing controller, two IBM 1403s and a Documation, Inc. printer, an IBM 3890 magnetic ink character recognition (MICR) reader/sorter with on-line reject reentry and a Memorex Corp. computer output microfilm (COM) unit.

On-line operations include a real-time trust system, real-time commercial loan system, real-time central index file (CIF), 10 Diebold, Inc. automated teller machines (ATMs) with four more planned within the next month, 350 Datatrol, Inc. machines in the branch network and 50 CRTs on both a local and remote basis. The computer operations department works a staggered two-shift, 24-hour day, seven days a week, with personnel working four days on and four days off.

Daily application activity includes 110,000 demand deposit accounts, 200,000 savings accounts, 75,000 installment loan accounts, 3,000 trust accounts and 170,000 - 280,000 items going through its proof-of-deposit and IBM 3890 MICR reader/sorter.

"We needed more horsepower today and couldn't get it in the prescribed time," Chevalier says, "so we investigated a third-party IBM 158, Itel Corp., CDC's Omega II and the Magnuson M80/4."

"We selected Magnuson because of the computer's physical architecture and internal technology, which included the ability to upgrade this computer in the field as opposed to changing mainframes; Magnuson's commitment to support future DOS/VSE 4300 software; the fine internal maintenance diagnostics; and the ability to supply the needed computing power immediately," Chevalier indicated.

The bank has experienced "zero" DOS/VS CICS incompatibilities with installation of the M80, Chevalier added.

The M80 Benchmark showed performance 1.7 times that of a 370/145 and the machine is currently running at 158 levels, according to Chevalier.

IBM 370/168 Auctioned Off For $1 Million

CHICAGO — For the second time in recent months, an IBM computer system went on the auction block here and the 370/168 system brought $1,018,000.

Originally the system had been worth approximately $4 million, according to Guarantee Appraisal Corp. (GAC) of Los Angeles, who conducted the sale.

The unit, which had been owned by Itel Corp., had been on lease at an insurance company before the sale.

GAC provides lending institutions with an appraisal package that is the only one of its kind in American business, according to Jerome Silverman, president of the firm.

The package involves assigning a liquidation value to equipment pledged against a loan or lease. GAC, when called upon, also liquidates properties whose values it has determined.

Under its normal appraisal procedure, GAC 's insurance company indemnifies a property owner against an erosion of a property's value when it comes off lease.

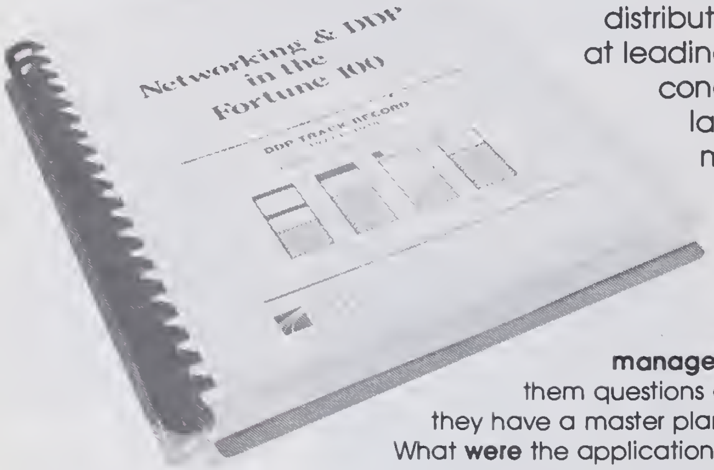
Silverman noted that the auction "is clear proof that our company is standing behind our computer appraisal agreements despite a harassing lawsuit filed at the end of July by a group of European insurers and later withdrawn."

The plaintiffs alleged that GAC — along with Itel Corp. of San Francisco, Marsh & McLennan of New York and Americas Insurance Corp. of New Orleans — had used misrepresentation in obtaining reinsurance contracts. The charge was vehemently denied by all the defendants.

The suit was withdrawn by the plaintiffs in October with no payments or agreements by any defendants. "This was a clear indication to us and all concerned that it had been without merit," Silverman stated. "Nevertheless, it grabbed publicity and damaged reputations."

This is the second sale of its kind in recent months. The first auction, also conducted by Guarantee Appraisal, was held in Chicago in July.

NETWORKING AND DDP IN THE FORTUNE 100



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Starts With Stand-Alone

Xmark Announces Family of Systems

COSTA MESA, Calif. — Xmark Corp. has unveiled a family of systems that range from a stand-alone unit for the small business user to a shared-resource, hard disk system for multiple users.

The stand-alone Office Mate features an intelligent input terminal; 48K bytes of random-access memory (RAM); two built-in double-sided, double-density floppy disk drives with a capacity for 600M characters of data; and a NEC Information Systems, Inc. Spinwriter printer. A variety of high-density dot matrix printers are available as options.

The terminal is made up of a 14-in. CRT and keyboard that is microprocessor-controlled and has a scratchpad memory. Geared for both standard DP chores and word processing functions, it can take advantage of the following communications disciplines: asynchronous — teletypewriter, Telex, TWX, ATS and ATMS, as well as remote data base diagnostics; and synchronous/binary synchronous — IBM 2780/3780, 3270 and Time Sharing Option (TSO), Univac UT 200 and Burroughs Corp. protocol.

The Office Mate ranges in price from $9,500 to $14,500.

One Configuration of the Mini Cluster

The Mini Cluster was designed for a medium-sized company requiring several workstations to accommodate document handling. Available in a number of configurations, the package consists of a master processor with 64K bytes of RAM and all of the features of the Office Mate.

However, the Mini Cluster's processor is capable of handling file accesses from up to four secondary processors while simultaneously conducting word processing, data processing or communications functions, the spokesman claimed.

In fact, he added, this system's processor can actually serve as a supervisory tool in a multiterminal environment, he added.

The Mini Cluster's memory storage is provided by the Intelligent Information Storage

(Continued on Page 66)

Thousands of Boards, Circuits Tested Automatically by Mini

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DALLAS — Building a cost-effective, minicomputer-based circuit test system was one of the first steps toward developing sophisticated commercial telecommunications systems for scientists here at Rockwell Collins' Automatic Test Center.

Based on a Hewlett-Packard Co. 1000 minicomputer, the system can test thousands of different boards and circuits which go into the firm's communications products. "Hooking up additional instruments for new testing requirements now costs us less than $200 in time and resources. On our older systems, this used to cost up to $10,000 and take many weeks to complete," according to Frank Krizan, manager of the test center.

The Automatic Test Center — used by all the Rockwell Collins profit centers in the Dallas area — operates 24 hours a day, seven days a week. The mini-based test system is helping ensure that the center is flexible enough to meet all the different demands which arise.

The computer is not only capable of carrying out several automatic tests at once, but it can also be used simultaneously for program development and management report production.

"The minicomputer is capable of running several remote satellite test stations. This means that as our testing requirements increase, the system can be quickly and easily

(Continued on Page 70)

Disk Systems for HP 3000 Offer Four Times HP Disk's Capacity

SUNNYVALE, Calif. — Microcomputer Systems Corp. has designed two disk system packages to provide Hewlett-Packard Co. 3000 minicomputers with up to four times the storage capacity of HP's largest disk unit.

The Model 1694 intelligent disk controller handles up to eight industry-standard disk drives of 300M-byte capacities, while the Model 1696 can accommodate eight 600M-byte devices, a spokesman said. HP's largest disk drive, the 7925, reportedly stores 120M bytes of formatted data.

Both of Microcomputer Systems' controllers are fully compatible with the host HP 3000 system and can be added without changing existing operating system software, according to the spokesman. The disk package includes a host adapter and a single printed circuit board that plugs into the 3000's selector channel to obtain the signals needed for HP drive emulation.

The disk system features data buffering by 40-byte first-in/first-out buffer memories.

The controller-based systems are said to allow relatively unlimited expansion of on-line storage — up to 4G bytes — while the HP drives are limited to about 1G bytes.

The prices of the Microcomputer Systems units vary, but the Model 1694 controller with a 300M-byte drive costs about $23,500, approximately $12,000 less than a similar HP system, the spokesman said from 432 Lakeside Drive, Sunnyvale, Calif. 94086.

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PDP-11/70 Users Get Disk With Capacity Up to 2G Bytes

IRVINE, Calif. — A disk subsystem was recently announced by Plessey Peripheral Systems to replace Digital Equipment Corp.'s RWP04, RWP05 and RWP06 subsystems for PDP-11/70. The Plessey subsystem can be configured for a maximum capacity of more than 26 bytes.

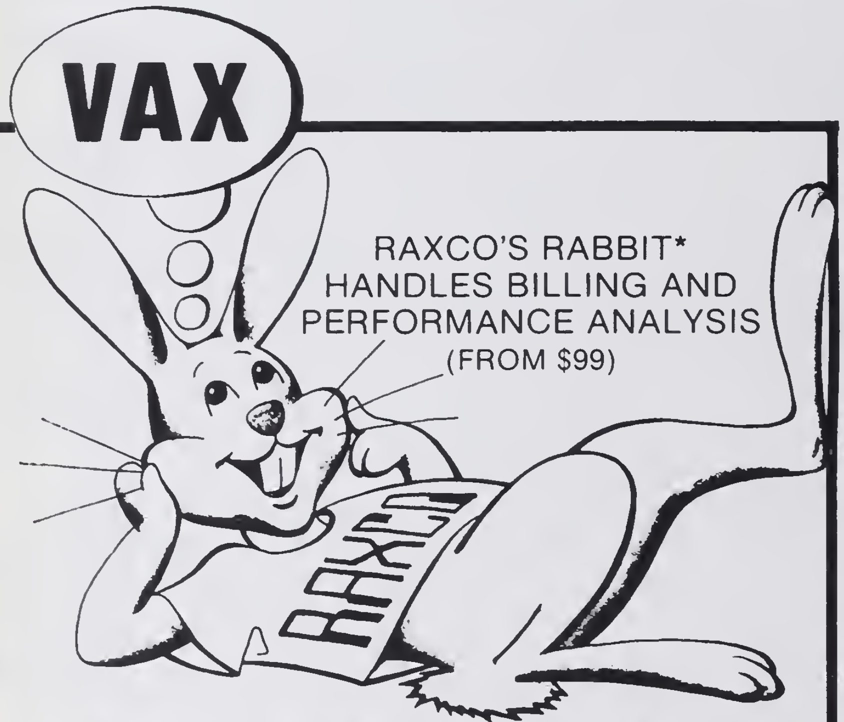
The PM-DSW11/300 disk subsystem consists of a pedestal-mounted disk drive, a controller chassis and a data and control coupler. The controller replaces up to eight DEC control logics and supports up to eight 254M-byte drives, a spokesman said.

Each disk pack has a formatted capacity of 253.6M bytes. Removable packs are said to provide unlimited off-line storage.

Plessey's data and control coupler plugs directly into DEC's RH70 module slots, interfacing with the CPU via the Unibus and the cache bus. The system includes error detection and correction capabilities, logical drive address functions, implied seek, rotational position sensing, fault test, off-line diagnostics and self-test routines.

The PM-DSW11/300 costs $28,795, with quantity discounts available from Plessey at 17466 Daimler, Irvine, Calif. 92714.

Plessey PM-DSW11/300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Mass Core Storage System Replaces Fixed-Head Disk

PLANTATION, Fla. — Digital Data Systems, Inc. has introduced a mass core storage system that can be used as a fixed-head disk replacement for any minicomputer system.

The Megacore is available in increments of 128K or 512K bytes. It can be expanded up to 4M or 8M bytes.

Word length for the system is 16 bits, with a maximum access time of about 2 msec, a spokesman claimed.

The storage device operates in sector/subsector read and sector write modes and performs its own internal parity generation and checking. It features a write protection mode and was designed to function in hostile environments — in the presence of high temperatures, for example.

The Megacore sells for approximately $12,000 per 512K bytes, depending on the interface desired, from the company at 1396 N.W. 65th Terrace, Plantation, Fla. 33313.

ASC Portable Micro System Runs With Intel MPUs

ST. CLAIR SHORES, Mich. — The Portable Microcomputer System is being offered by Applied Systems Corp. (ASC) for off-site, mobile or remote computing and data acquisition applications.

Designed for severe field or industrial environments, the system features an industrial enclosure or high-durability carrying case surrounding an Intel Corp. programmable 8085 microprocessor.

Expandable memory modules, input/output adapters and data communications/interface options are integrated with an alphanumeric data display and Ascii or hex keyboard unit.

Data display specifications range from 16 to 40 alphanumeric characters with custom options for up to 240 character displays, the firm said. The system also offers random-access memory and programmable read-only memory of up to 64K.

Either 120Vac, 12- and 24Vdc or battery power supply options can be used to operate in a remote plant, office/-mobile or field installation. A built-in charger is also available for battery-powered options.

System design features include plug-in cards for the microprocessor unit, memory modules, analog and digital I/O and optional data displays, as well as provisions for operator control panel and ac or dc power supplies.

Optional features include a magnetic tape cartridge, logging printer unit and acoustical modem adapter. An Intel Z80 microprocessor can be substituted for the 8085, the company said.

A software library is offered by ASC, as is custom engineering and prototype capabilities for special production requirements, the firm said.

The price of the system starts at $1,900 from ASC, 26401 Harper Ave., St. Clair Shores, Mich. 48081.

Disk Controller Emulates DEC's

EATONTOWN, N.J. — Diva, Inc. has introduced a disk system controller that allows Digital Equipment Corp. minicomputer users to utilize an 80M-byte unformatted Winchester-type drive and an 80M-byte unformatted removable storage module device as backup combinations.

The Comptroller V allows both types of disk units to transfer data at up to 1,209 byte/sec, is software-transparent to the host processor and emulates the original manufacturer disk subsystems. The controller can handle up to eight disk drives each, with a total capacity of 300M bytes per drive.

The unit also features internal on-the-fly error correction capabilities and self-check routines, a spokesman said.

Controller systems are also available for Data General Corp. and Interdata machines.

The DEC-oriented system is designated the DD-786W and costs about $23,000, the spokesman said from the company at 607 Industrial Way West, Eatontown, N.J. 07724.

Xmark Adds System Family

(Continued from page 65)

Module (IISM), which is made up of a modified Winchester technology 2M-byte hard disk drive and an 8-in. floppy disk drive. Bound in the same chassis, the units can be accessed via the master processor within 8 sec.

The system's secondary processors contain the same CRT and keyboard configurations as the main CPU, but are molded to fit specific operational requirements. These functions range from basic data entry and processing to extended word and data processing.

Each secondary processor is capable of supporting its own printer or may access the master processor's printer in a queuing mode.

The Mini Cluster is priced from $27,000 to $45,000.

Finally, Xmark introduced the Maxi Cluster, which has the same basic capabilities as the other two systems but will support up to four 20M-byte or two 96M-byte hard disk drives and up to 32 terminals or secondary processors.

The unit can handle up to eight master processors, which function as Mini Cluster systems with independent local memory, secondary processors and printer clusters. Each processor is also capable of accessing a common data base on the hard disk storage; if a problem develops in any part of the set-up, however, none of the other processors are affected, the spokesman noted.

The cost of the Maxi Cluster begins at $40,000, the spokesman said from Xmark at Suite 119, 3176 Pullman St., Costa Mesa, Calif. 92626.

System Travels With Salespeople

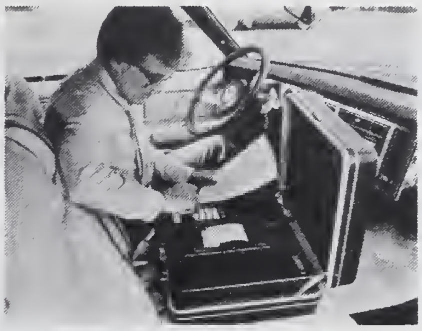
CEDAR RAPIDS, Iowa — Designed for the sales and distribution fields, Norand Corp.'s Route Commander microprocessor system can be mounted in a truck or carried in a briefcase and can process inventory records and delivery schedules and transmit information to a central site.

The standard delivery-oriented unit consists of a portable data collection terminal, 16K bytes of memory, a 26-column printer and a battery charger. Optional equipment includes an additional 32K bytes of memory, an auxiliary battery pack, a battery charger, a telecommunications facility and a 40-column printer.

The Route Commander system provides on-the-road personnel with continuous adjustment of inventory and a printout of sales receipts to customers. The unit can compute prices and totals for quantity purchases and print daily cash reconciliation and sales reports.

Information can be transmitted daily to a central computer over standard telephone lines; system updates can be received during the exchange, a spokesman stated.

The unit costs about $2,695. Further information can be obtained from the marketing department of Norand's Computer Systems Division, 550 Second St. S.E., Cedar Rapids, Iowa 52401.



The Route Commander

Program Loader With RS-232 Has Portability

WATERTOWN, Mass. — Digital Laboratories, Inc. has unveiled an RS-232C-compatible portable tape cassette storage unit for field testing and loading programs into minicomputers.

The ACT-1200 features a character-buffered RS-232C interface that is said to eliminate extraneous interfacing or hardware when loading programs and taking diagnostics on-site.

The unit loads programs at rates up to 1,200 bit/sec and locates data blocks and programs by counter, a spokesman stated.

Resembling a standard cassette player, the device has a data indicator light that shows whether tapes are being played or recorded and an automatic turn-off for unattended operation.

Record/playback tape speeds are 1-7/8 in./sec, and the unit's proprietary nonsaturating recording technique reportedly ensures reliability with standard cassettes.

The device is packaged in a plastic case and comes with an RS-232C connector and a 4-ft cable.

Digital Laboratories is located at 600 Pleasant St., Watertown, Mass. 02172.

Tarbell Releases Floppy Interface

CARSON, Calif. — A double-density floppy disk interface said to enhance disk storage capacities with minimum reconfiguration of existing microcomputer systems has been announced by Tarbell Electronics.

The interface board is supplied with Tarbell's Basic Input/Output System software for the CP/M operating system on a single-density diskette, reportedly permitting the user to single- and double-density diskettes.

The system automatically determines whether single- or double-density is in use, Tarbell said. Up to four drives can be selected using either single or double density.

The 8-in. Shugart-compatible disk interface contains phase-lock-loop and write precompensation, said to provide reliable data storage and recovery. In addition, the on-board phantom bootstrap programmable read-only memory (Prom) is disabled on completion of the bootstrap operation, freeing the 64K of memory address space for other use, the firm claimed.

Multiuser operation is possible because of the direct memory access for single- or double-density operation.

The interface is shipped assembled and factory tested with a six-month warranty on parts and labor. It costs $425 from Tarbell, Suite B, 950 Dovlen Place, Carson, Calif. 90746.

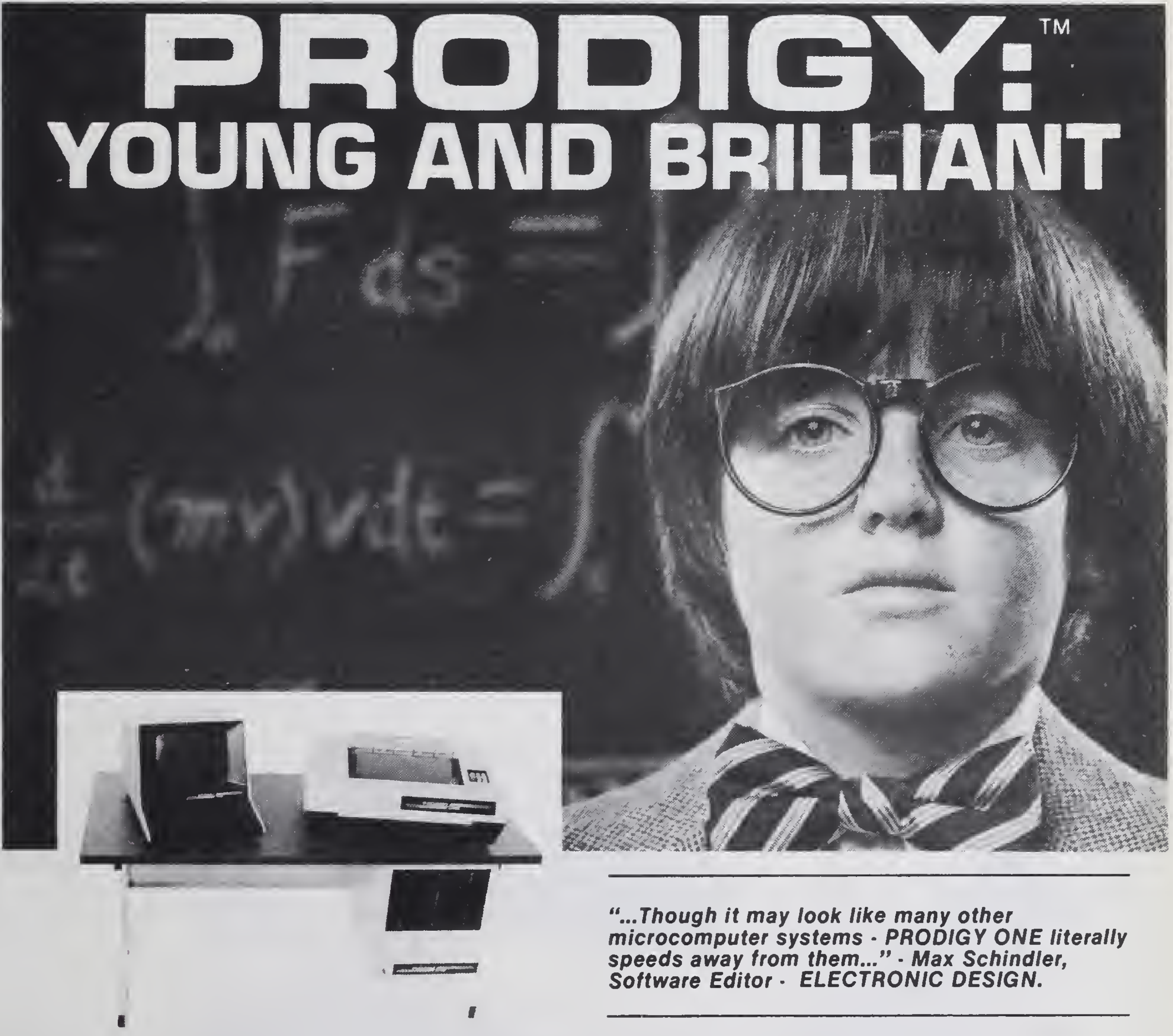
Tape System Fits VAX

ANAHEIM, Calif. — The Western Peripherals Division of Wespercorp has a tape subsystem for the Digital Equipment Corp. VAX-11/780.

The TS-130/VAX employs a driver for DEC's VMS operating system that allows the minicomputer to interface with the Western Peripherals TC-130 magnetic tape controller. Eight drives can be handled by a single controller.

The tape subsystem, including a 45 in./sec dual-density 800- and 1,600 bit/in. drive, is priced from $7,600.

VAX users can also purchase a VMS driver/TC-130 controller package for their drive for about $3,500, the spokesman stated from the firm at 1100 Claudina Place, Anaheim, Calif. 92805.



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For better management of bottom line finances, HP has designed OM/250, an integrated, modular Order Management package. The Order Entry module, for instance, simplifies all types of order transactions, including multiple price breaks, exception posting, and even back orders. Other modules provide powerful capabilities for managing inventory and accounts receivable, as well as for sales analysis. There's also a special "configurator" program that helps you customize the machine even further.

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Vendor Picks Mini to Test Circuits and Boards

(Continued from Page 65)

expanded to handle these new applications without an enormous capital investment," Krizan explained.

Two key features make the automatic test system flexible: The Real Time Executive (RTE III) operating system and an HP-IB interface bus to link instruments to the computer.

The RTE software allows the CPU to do multitasking. This permits a far greater use of the computer's processing power compared with dedicated systems and makes it far simpler to expand the capabilities of the testing system, Krizan said.

The test instrumentation interfaced with the HP 1000-controlled test system includes programmable and fixed power supplies, a digital voltmeter, a wave-form analyzer, a network analyzer, an audio frequency generator, pulse generator and an electronic counter.

CRT Access

Access to the system is by means of three HP 2645 CRT consoles. The main system console is used for programming, entering and extracting management information. A second console is part of the actual testing station, while the third is some 100 meters away in the engineering office, linked to the CPU via a short-haul modem.

"This CRT remote from the test area saves valuable time for engineers working on program development," Krizan said. "Working at the main console, they were frequently distracted by the testing activity taking place around them."

Peripherals include an HP 7905 disk drive which provides 15M bytes of storage capacity and an 800 bit/in., nine-channel magnetic tape unit for storing historical information. One line printer logs test diagnostics and another is used for programming.

In addition, a teletypewriter is utilized for work-in-progress supervision and control.

Testing a Board

For each type of printed circuit board, the operator has access to a test manual which tells him precisely which test adapter to use, which program, what constitutes a pass or fail and any additional relevant information.

At the test station, the operator uses the CRT console to enter details of the printed circuit board and the test (program ID, serial number and test conditions, for example interactively in simple English. He then presses the run button and the HP 1000 takes over.

More than 300 to 400 readings are taken automatically and compared against specified data for that board type. If any reading falls outside the allowed parameters, the board is failed.

The operator is informed of the failure by a message on the CRT; with a high-volume board, the area of failure can also be given. Simultaneously, a hard-copy printout of this information is produced on one of the line printers.

A repair technician takes the failed board and, aided by the printout, uses one of several manual testing stations to locate the fault. The board is repaired and, as a final check, the technician puts it through the automatic test procedure a second time.

To make full use of the HP 1000's multitasking capability, Rockwell Collins is using HP's Image data base management system. Designed for use with HP 1000 minicomputers, Image is a complete set of software tools which consolidates information into a single data base. Rockwell Collins uses it to produce a multitude of reports.

One report which is produced on a regular basis is a system usage statement. This summarizes the time spent on each type of test and shows standard deviations, helping monitor the test system's efficiency, Krizan said.

This year, the test center plans to upgrade to RTE IV, HP's latest operating system. It is a disk-based time-and-event-scheduled, real-time multiprogramming system capable of concurrent execution of real-time, interactive and batch programs by HP 1000 computers.

Its greater multitasking capability will further increase the test system's flexibility, Krizan said.

The recent purchase of an HP 3070B real-time applications terminal is opening the door to further expansion, he added.

The terminal can be located up to two kilometers from the CPU and can take data from 13 HP-IB-compatible instruments.

Micronovas Get Batteries For Short-Term Outages

WESTBORO, Mass. — Battery backup options that reportedly permit the Micronova MP/100 and MP/200 microcomputer-based business systems to operate during short-term power failures have been announced by Data General Corp.

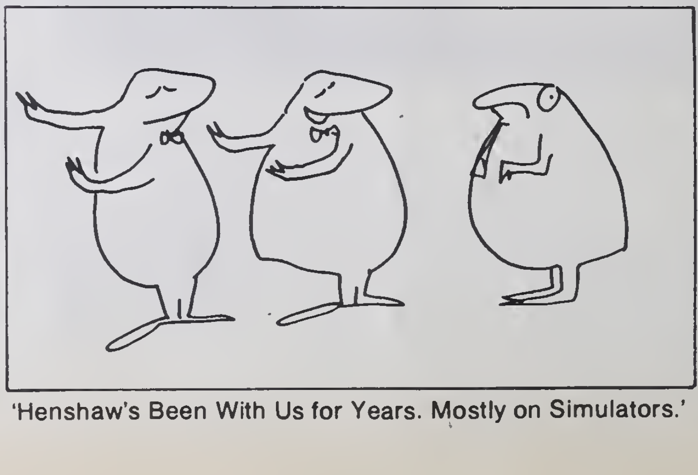
Contained on a printed circuit board, the Model 4315 battery backup is said to contain all the circuitry required to keep an MP/100 or MP/200 system operating. All voltages are maintained and fans are kept operating for normal operation of all chassis-mounted components, DG said.

The electrical power can be supplied by DG's Model 4316 battery pack or two ordinary 12V car batteries on the backup board, according to a spokesman.

The Model 4316 itself consists of two 12V batteries connected in series and includes mounting hardware and a cable that plugs into the backplane of the system chassis.

If a power failure occurs, the 2.5 A/hour battery pack will supply power for 16 minutes to a 64K-byte MP/100 system and for seven minutes to a 64K-byte MP/200 system, the firm claimed.

The Model 4315 battery backup board costs $400, and the Model 4316 battery pack costs $100, DG said from Rte. 9, Westboro, Mass. 01581.



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Firm Bent on Survival

CCI Again Walking on Financial Coals

By Marcia Blumenthal
CW Staff

OTTAWA — Less than eight years ago, Consolidated Computer, Inc. (CCI) rebounded from receivership.

Less than one year ago, with a hefty contract from the State of Arizona in hand, the firm moved its U.S. corporate headquarters to Tempe and announced a new generation of key-to-disk data entry products that were expected to generate substantial sales.

Today, CCI is again walking on financial coals. But it is bent on surviving, so it is now retrenching, restructuring its organization and preparing a distributed data processing product for introduction next year, according to Les Sellmeyer, the firm's president.

CCI is feeling financial heat because customers are making do with old equipment rather than updating to new-generation key-to-disk equipment as expected, Sellmeyer said. However, he attributed CCI's sluggish sales primarily to the difficulty of selling in a saturated market.

One industry source pointed to a similar problem at Inforex, Inc., which this year experienced more upgrades of current equipment than sales of new equipment.

CCI expected to sell 120 Series 2 Model 2000 systems this year, but sold only about half that number. In 1978, the company sold 84 of those systems.

CCI's U.S. sales for 1979 were projected at $20 million, but will be closer to $8 million, Sellmeyer predicted. The firm expected overall revenues to climb to $35 million this year and geared its expense spending to that level.

CCI will probably finish the year with $25 million in revenues, but will incur a $3 million to $4 million loss for the year, Sellmeyer said. Last year the firm's revenues reached $23 million and its earnings totaled $613,899.

To make matters worse, the contract with the state of Arizona, valued at about $3.4 million, produced only about $500,000 in revenues, Sellmeyer noted candidly. That contract called for CCI to provide a remote job entry system tied to Honeywell, Inc. Level 6 processors that CCI was buying on an OEM basis from Honeywell.

Sellmeyer said he is currently not at liberty to discuss the failure of the contract, but did say CCI's "relationship with Honeywell was less than satisfactory."

Staff Consolidation

Although Sellmeyer has discounted the prospect of another bankruptcy filing, the firm's performance posted in the first half of the year — a loss of $818,000 on sales of $15 million — showed a need for organizational revamping.

CCI has consolidated its U.S. corporate staff, moving them to its main corporate headquarters here. The former U.S. headquarters in Tempe will remain a distribution and spare parts center. About 40 people have been laid off in the U.S.

In addition, CCI closed sales offices in Chicago and Houston that were producing virtually no sales. Although claiming that CCI

(Continued on Page 74)

Videotex Competition Heating Between Canada, UK and France

By Phil Hirsch
CW Washington Bureau

OTTAWA — Canada, the UK and France are competing fiercely to get their own videotex systems adopted as an international standard. At stake are jobs, export earnings and image.

The British are ahead, at least for the moment. Not only is their Prestel system the only one in commercial operation, but they've licensed the system to a number of other countries — including the U.S., where General Telephone & Electronics Corp. is planning a test in Florida next year.

Meanwhile, Microband Corp., a U.S. multipoint distribution services (MDS) carrier that provides auxiliary transmission to cable TV and pay TV networks, reportedly is on the verge of signing a licensing agreement with the French for their Antiope system.

Videotex, Teletext

Videotex, basically, is an interactive data base retrieval system that displays a wide variety of information — stored in a computerized central data base — on a commerical TV screen in the user's home or office. The information is sent in response to queries from the user, who specifies what he wants

(Continued on Page 72)

DEC Lab Group, BBN Ink Pact

CAMBRIDGE, Mass. — Bolt Beranek and Newman, Inc. (BBN) and Digital Equipment Corp.'s Laboratory Data Products Group have entered into a joint marketing arrangement for BBN's RS1 application package.

Although DEC has cooperatively marketed products with other vendors before, the Laboratory Data Products Group is reportedly the first within DEC to have created a formal function responsible for seeking out joint ventures.

The formal joint venture arrangement was proposed by the group to DEC management last August and approved in October, a source noted.

Developed for the DEC PDP-11 processor, BBN'S RS1 is a general-purpose laboratory application package designed for scientists. Using an English command language, the scientists themselves can perform a full range of statistical analyses, a BBN spokesman said.

The package, released last May, is BBN's first commercial system and has had a good reception in chemistry and pharmaceutical labs, he said.

In selling RS1, both DEC and BBN will be present at sales calls; if the customer decides to buy the PDP-11 with the RS1 package, however, each firm will write a separate purchase order. The firms will also service their products separately.

In addition to RS1, DEC is jointly marketing three other products, including a turnkey system for chemical compound analysis.

DEC is also working with its own word processing group to determine how a word processing product can fit into the laboratory environment, the source noted.

The Laboratory Data Products Group is reportedly seeking specific products rather than waiting for vendors to present products to the firm.

Randal Lands in Hot Water; President-Founder Steps Down

By Marcy Rosenberg
CW Staff

TORRANCE, Calif. — Randal F. Walti, president, chief executive and founder of Randal Data Systems, Inc., has stepped down in the wake of financial difficulties that led the firm to dismiss almost 50% of its work force.

Replacing Walti was John F. LaBarbera, the company's chairman and president of Corporate Group, Inc., a management consulting firm. James E. Navarre, a director, was named to head a program to seek additional financing for Randal Data, which has begun to reorganize outstanding debt and management "to allow continuation" of its operations.

Sources close to the company said Randal Data unsuccessfully sought venture capital financing for the past five months and now is looking for buyers. Although they indicated that three or four firms are interested in acquiring the financially troubled small business computer manufacturer, none were named.

Randal Data attributes its financial woes to falling order rates for its upper line Randal 100, 200 and 500 series of small business systems and to "significant" expenses it has carried for development and initial production of the new lower end Randal 5000 computer. The Randal 5000 sells for about $12,000 including canned application software and printer.

The company spent between $750,000 and $1 million to get the Randal 5000 off the drawing board and into production, sources said, noting that 35 to 40 of the systems were shipped in the fourth quarter ended Oct. 31. By the end of the third quarter, backlog for the Randal 5000 stood at more than $2 million.

For its higher end systems, however, domestic order rates dropped off in the first three quarters of this year. Although this dip was somewhat tempered by an expanding international market, the firm did not start to see those gains until the third quarter, according to sources. The Randal 100, 200 and 500 sell for $25,000 to $75,000.

Another blow came in October, when the company lost a minimum $5 million order from British GEC Corp. after a dispute between the two firms over test specifications.

Randal Data's cash flow problems eventually forced the company to lay off 45 of its 95 employees. Although personnel cuts spared no operation, manufacturing was hardest hit.

Reached at home, Walti said he resigned "to allow new management to deal with the bank and creditors on a going-forward basis." Walti, who founded Randal Data in 1971 "in my son's bedroom," owned a 53% interest in the company a year ago; he currently owns "close to 50%" of the firm's outstanding common stock. "I still have control of the company," Walti commented.

Beehive Quarter Best Yet

SALT LAKE CITY, Utah — Beehive International achieved the highest level of sales in its 11-year history during its fourth quarter finishing out the fiscal year with total revenues of $24.3 million. Last year the terminal maker had sales of $18.4 million.

Earnings for fiscal 1979 reached $1.2 milion or $1.01 per share compared with a loss of $2.7 million or $2.18 per share for fiscal 1978.

Before an extraordinary credit for a tax-loss carryforward, net income for the year was $822,515 or 65 cents per share.

In its fourth quarter, Beehive's revenues totaled $6.9 million compared with the $6.1 million reported in the same period a year ago.

Earnings from continuing operations for the final quarter were $236,998; an additional $175,800 for a tax-loss carryforward brought total earnings to $412,798 or 32 cents per share. For fiscal 1978, the firm's fourth quarter reflected a loss of $696,677 or 55 cents per share.

Beehive's president and chief executive officer, Warren B. Clifford, said the addition of the DM series to its Micro Bee line enabled the expansion of the company's product line to more sophisticated markets. He cited this as a significant contribution to the company's performance.

During the year, the firm acquired certain assets of Electronic Specialty Products, a manufacturer of printed circuit boards. This will allow greater control of manufacturing, reliability and delivery of these components, Beehive said.

Nickels & Dimes

Preliminary merger discussion with Four-Phase Systems, Inc. and McDonnell Douglas Corp. were terminated by mutual consent, **Inforex, Inc.** reported. Inforex intends to continue merger discussions with other parties and possibly develop a reorganization plan that would not involve the acquisition of its business or assets by a third party, it said. Inforex filed for protection under federal bankruptcy laws on Oct. 23.

$ $ $

Automatic Data Processing, Inc. (ADP) is in the process of filing necessary documents with the Securities and Exchange Commission in connection with its acquistion of **Programmed Tax Systems, Inc.**, the largest preparer of computerized tax returns in the New York metropolitan area. For its last fiscal year, PTS sales were $3.1 million and net earnings were $529,675. The acquistion should be completed by January, 1980, ADP said.

$ $ $

National Semiconductor Corp. has signed a $50 million credit agreement with five U.S. and two foreign banks. The loan is a seven-year combination domestic and Euro-currency revolving term loan.

Rivalry Heated Over Videotex

(Continued from Page 71)

by depressing certain buttons on a keypad, about the size of a pocket calculator, attached to his terminal.

A teletext system provides similar kinds of information, but is noninteractive. Teletext information is typically transmitted on a commercial TV channel. A series of coded frames containing all the information in the data base is broadcast over and over again, and the viewer, by indexing specified codes into his keypad, programs the decoder to "grab" the related frames as they pass by.

Mass Market

Millions — perhaps billions — of dollars are at stake in the international videotex/teletext race because it is generally agreed this technology will lead relatively soon to a mass market in home computers. Business users are the initial target, however; they have more money to spend for on-line information services and a greater willingness to do so.

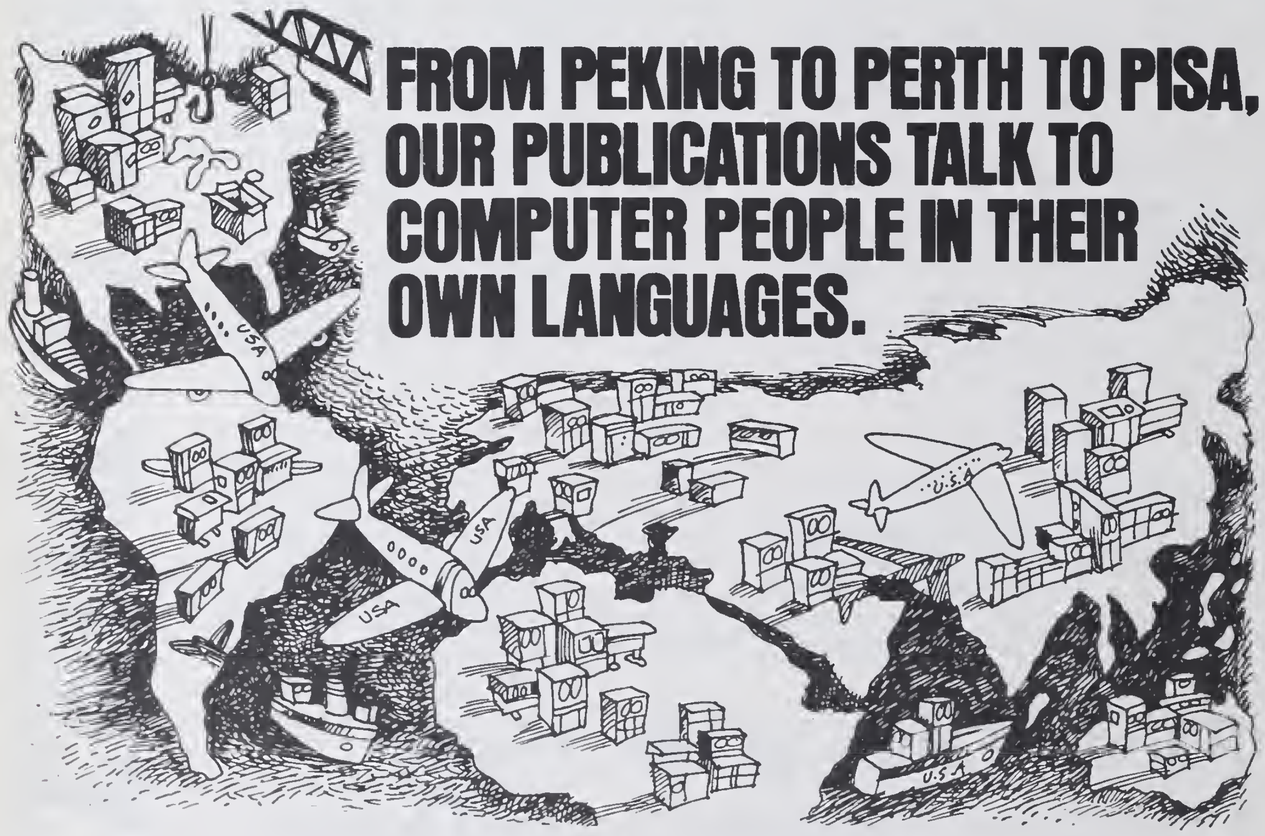
In Canada and the U.S., a number of videotex trials are scheduled to begin during the next two years. The operators of these tests hope to show that many on-line information services presently used by business can be improved greatly and/or reduced in price by employing videotex distribution instead.

A big advantage of this newly emerging technology is its ability to display information in graphics form more cost-effectively than conventional communications services. The Canadians argue that their Telidon system does a better job in this area than either Britain's Prestel or France's Antiope technology.

Canada was the last of the three to get into the videotex race, however, and its Telidon terminal requires more memory than the others — which means additional cost and a smaller potential market, according to some observers.

The Canadians prefer to say that theirs is the first of the second-generation videotex systems, as John Madden pointed out recently. Madden is director-general of special research projects for the Canadian government's Department of Communications (DOC) and a key architect of the Telidon development effort.

DOC has earmarked approximately $9 million to subsidize field trials and further development of Telidon hardware and software within Canada during the next four years.



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EDS to Extend Foray Into Small Business Mart

DALLAS — Confirming its entry into the small business system market, Electronic Data Systems Corp. (EDS) will open by the end of January four EDS Business Systems Centers outside of Texas.

The firm has been studying the small computer market for the past two years and opened two pilot centers earlier this year, one in Houston and one in Dallas. The new centers will be located in Chicago, Atlanta, Washington, D.C., and Cincinnati.

In February, EDS created within its General Systems Group a Business Systems Divison responsible for marketing small systems. Joe Glover is the general manager of this division.

Wider Range

Presently EDS centers are selling Digital Equipment Corp. Datasystem 300 systems and Data General Corp. Nova 3 and 4 systems. In the future, EDS plans to offer a wider range of hardware, adding the lines of firms such as Hewlett-Packard Co. and Texas Instruments, Inc., a spokeswoman said.

However, aside from hardware, the company's orientation to service and the provision of small business application software for specific industries is the way EDS plans to crack the highly competitive small systems market, according to Herb Jones, vice-president of EDS' General Systems Group.

The Business Systems Centers initially will offer software application products for legal offices, certified public accountants and specific wholesale/distribution industries.

EDS is enhancing many of its existing packages and will be developing several new ones, introducing them during the first part of next year, the spokeswoman said. These include medical, dental, property management and word processing applications.

On the service side, EDS provides end-user documentation services; classroom and on-site training; sales information and education seminars; and other standard services, the firm said.

EDS pointed to its acquisition of Compusource Corp. earlier this year as a further commitment to the small business sector. Compusource is an eight-year-old firm that supplies software for the wholesale/distribution industry, custom programming and minicomputers to small business, EDS said.

On the average, each center will be staffed by 15 people, including sales and customer service representatives. The prices of systems will range from $15,000 to more than $100,000.

EDS is an international computer services firm with 1979 revenues of $274 million.

Funds Divesting Computer Stocks

SILVER SPRING, Md. — Computer and office equipment stocks led the net sell list for mutual funds as these funds divested themselves of a total of $130 million during the third quarter, according to Computer Directions Advisors.

Primary targets for sell-offs by mutual funds were IBM and NCR Corp. Funds sold off $143 million more of IBM and $36.3 million more of NCR than they purchased.

For the year to date, mutual funds have been selling more computer and office equipment stock than they have been buying, Computer Directions Advisors reported. Funds sold off a total of $111.8 million of these stocks during the first quarter and $101.2 million during the second quarter.

Woolworth Gives IBM Big Order

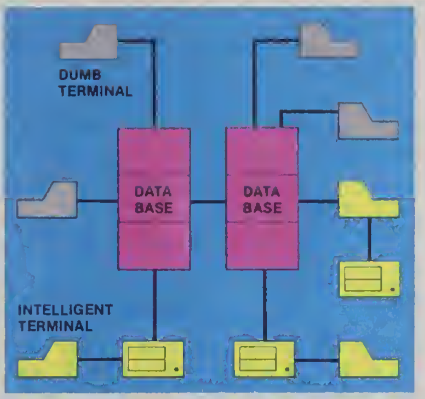
NEW YORK — The F.W. Woolworth Co. will install 8,000 IBM point-of-sale (POS) terminals in four of its retail divisions.

It is the largest single order for retail POS terminals ever placed with IBM.

The IBM 3683 and 3684 terminals, part of the recently introduced Programmable Store System, will be used in the purchaser's Woolco USA and selected Woolworth Stores, Kinney Shoe Corp., Susie Casuals, Richman Bros., Anderson-Little and J. Brannam stores.

Microcomputing comes of age.

Ohio Scientific's OS-65U Level 3 operating system software brings new networking and distributed processing capabilities to microprocessor based computer systems.



Until now, the only alternative for low cost multiple-user computer applications was time-shared systems. However, a serious drawback of microcomputer or minicomputer multi-user time-share systems is the fact that under heavy work loads they slow down to a crawl since the central processor time in such a system is shared by all of the users.

In a microprocessor based distributed processing system, using floppy based microcomputers as intelligent terminals (local systems) most of the work load is handled locally. Overall system performance does not degrade under heavy job loads. Each local system performs entry, editing and execution while utilizing the central data base for disk storage, printer output, and other shared resources.

For more demanding applications it is desirable to have several data bases, each with its own collection of local systems. Such an inter-connected set of data bases is called a network. Each data base and its local intelligent and dumb terminals is called a cluster.

Level III

OS-65U Level 3 now supports this advanced networking and distributed processing capability as well as conventional single user operation and time-sharing. Level 3 now supports local clusters of intelligent microcomputer systems as well as dumb terminals for the purpose of utilizing a central Winchester disk data base and other shared resources. The system also has full communications capability with other Level 3 data bases providing full network capability.

The system utilizes Ohio Scientific's low cost, ultra high performance computer systems throughout for intelligent terminals as well as data bases. This general systems configuration provides a cost/ performance ratio never before attained in this class of computer power.

Level 3 resides in each network data base. A subset system resides in each intelligent terminal. Each data base supports up to 16 intelligent systems and up to 16 dumb terminals. However, since dumb terminals can heavily load the system, they should be kept to a minimum. Level 3 also supports a real time clock, printer management, and other shared peripherals.

Data Base Requirements

Minimal requirements for a Level 3 network data base are a C3-C or C3-B computer system with 23 or 74 megabytes respectively, console terminal, 100K bytes RAM and a CA-10X 16 port I/O board for network and cluster communications.

Intelligent Terminal Requirements

Any Ohio Scientific 8″ floppy based computer with 56K RAM and one data base communications port.

Connections

Intelligent terminals and networked data bases are connected by low-cost cabling. Each link can be up to 10,000 feet long at a transfer rate of 500K bits per second, and will cost typically 30¢ a foot (plus installation).

Syntax

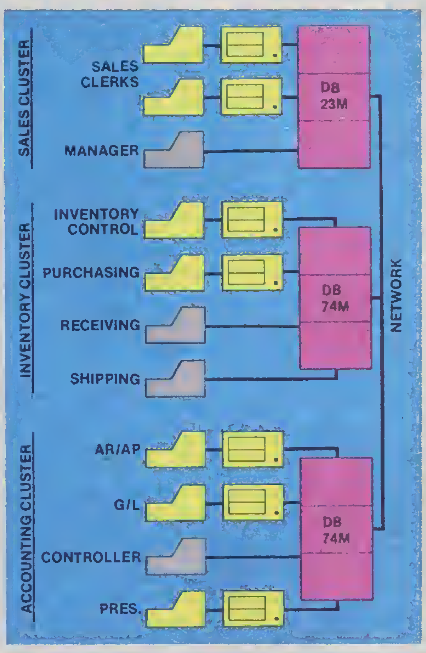
Existing OS-65U based software can be directly installed on the network with only *one* statement change! Level 3 has the most elegantly simple programming syntax ever offered on a computer network.

File syntax is as follows:

DEV A,B,C,D. Local Floppies } unchanged from single user and timeshare systems
DEV E Local hard disks }
DEV K-Z Specific network Data Bases

Each of up to 8 open files per user can be from 8 separate origins. Specific file and shared peripheral contentions are handled by 256 network semaphores
with the syntax Waite N
Waite N, close.

The network automatically prioritizes multiple resource requests and each user can specify a time out on resource requests. Semaphores are automatically reset on errors and program completion providing the system with a high degree of automatic recovery.



A Typical System

A typical system with two network data bases will have 148 megabytes of disk, four intelligent subsystems equipped with dual floppies, two dumb terminals, a word processing printer, a fast line printer, network data base manager software and 1000 ft. of interconnecting cable. Utlizing .7 MIPS processors throughout it will cost less than $50,000 plus installation. GT option computers (1.2 MIPS) can be utilized at a slightly higher cost.

One Step at a Time

Best of all, Ohio Scientific users can develop distributed processing systems economically one step at a time. A user can start with a single user floppy system, add a hard disk, then time-sharing, then a second Winchester data base for backup and finally cluster intelligent terminals to achieve a full network configuration.

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CCI Bent on Survival in a Saturated Market

(Continued from Page 71)

is doing well on the West Coast, to further economize Sellmeyer has closed one of CCI's sales offices in Los Angeles.

Other major sales offices in Philadelphia and San Francisco will now report directly to the Canadian operation.

Sellmeyer estimated that these moves, along with cutting some of the Canadian frills, will slice $2 million to $3 million off the firm's general and administrative expenses this year.

Aside from trimming, the firm has realigned, hiring its first engineering chief in May. Prior to this, Sellmeyer was also performing this function, which he admitted was part of the problem.

Falcon to Fly

Although Sellmeyer realizes the market for CCI's traditional key-to-disk data entry products is saturated, he thinks the firm can do at least a solid $8 million a year in this market in the U.S.

But, as part of the retrenching process, CCI must move in new directions. To that end it plans to introduce its Falcon system next January or February.

Falcon is an intelligent networking device with heavy communications capability built around CCI's Key Edit 22 system, Sellmeyer explained. It is configured to perform as a node in a distributed data processing environment.

Sellmeyer said that at its high end, Falcon is akin to IBM's 8100. Falcon's software will be written in Pascal, which removes the system from being machine-dependent, he added.

To get Falcon off the ground, CCI has secured from the Economic Development Board of Canada a guarantee of $5 million in loans with the Toronto Dominion Bank. The Canadian government owns 49% of CCI and the government of Ontario owns 17%.

And this year Fujitsu Ltd. used its option to buy an additional 5% of the firm, bringing the Japanese firm's ownership interest in CCI to 25%.

Fujitsu is the prime mover in the development of Falcon. CCI is primarily developing the software, Sellmeyer said.

CCI has two pilot Falcon systems installed with the welfare administration in Ontario, and Sellmeyer claimed the firm has a $1.2 million order backlog for the product.

Merger Hinted

With the development of the product, CCI's indebtedness will stand at $15 million by year end. Although CCI's debt burden is dangerously high, Sellmeyer does not see the Canadian government withdrawing support despite the new Administration's vow to "privatize" industry.

"The absurdity is that CCI is one of Canada's largest electronics firms," he said.

Although CCI is in a precarious financial position, Sellmeyer wants to reduce the government's ownership in the firm. A merger with a stronger partner within the next year may be one method of accomplishing this, he hinted, without naming a specific firm.

For the present, Sellmeyer is busily visiting CCI users to assure them of CCI's continued commitment to its products and customers.

"As many data processing skills as possible. As fast as I can learn them. That's my goal and I'm reaching it here."

Jerry Sugerman
Programmer/Analyst
informatics inc

"Data processing is growing so fast, you have to push just to keep up the skills you have. And frankly, when I joined Informatics, it was because I felt that working for this company was one way not just to keep up but to get ahead of the field. The variety of machines, software packages and programming languages I've been exposed to has been phenomenal.

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Univac Orders For the 1100/60 Now Top 100

BLUE BELL, Pa. — Univac has received more than 100 orders valued in excess of $70 million for its 1100/60 processor series, announced at the National Computer Conference last June.

H. Glen Haney, vice-president of worldwide marketing, said the 1100/60 shows signs of surpassing the market performance of the firm's most successful line of mainframes, the 1100/80 series.

More than half of the 1100/60 orders were written by Univac's International Division, including the Americas Domestic Division and the Americas National Division, responsible for South American, Canada and Mexico, Australia and New Zealand.

The remainder of the orders were received by Nippon Univac Kaisha, Ltd., the joint computer marketing venture in Japan.

'Pressing Social Need'

CDC's Norris Rallies for Entrepreneurs

By Jeffry Beeler
CW West Coast Bureau

SANTA CLARA, Calif. — Government regulation, dwindling supplies of investment capital and stiff competition from big business are dousing the entrepreneurial spark upon which much of the U.S.' social and economic well-being depends, according to Control Data Corp. Chairman William C. Norris.

Only about 20% of all infant businesses (including those in the high-technology field) survive, and more than 400,000 such firms fail each year, Norris said recently at the annual American Electronics Association (AEA) meeting here.

To cut this "shocking" mortality rate and the "social waste" it causes, Norris proposed creation of a masive, systematic program to stimulate formation of millions of new small businesses.

Among other proposals, the CDC chief called for:

- Trimming the capital-gains taxes to 25% for firms with 100-500 employees and to 10% for companies with fewer than 100.
- Amending the Employment Retirement Income Security Act to allow pension-fund managers to invest as much as 5% of their assets in small businesses.
- Allocating at least 10% of all federal research and development funds to start-up companies.
- Allowing small firms to guard against financial hard times by creating a tax-deductible reserve of research and development funds.
- Using tax incentives to encourage large companies to make their technology available to smaller firms.

Big Business Support

Although both government and the nation's university system can play a major role in bolstering small enterprise, the most important source of support is big business itself, Norris said in accepting the AEA's 1979 Medal of Achievement award.

Efforts to improve the U.S.' small business climate present large corporations with a major new opportunity for profitable business, the CDC head added.

Moreover, a strong small business sector ranks as one of the country's most pressing social needs, Norris said.

Small firms account for more than half the U.S.' total employment and for almost all its new jobs. Between 1969 and 1976, for example, companies with fewer than 500 employees created 87% of the private sector's job growth, he noted.

Ideas and Innovations

Small business also makes a "disproportionately large contribution to innovation," Norris said.

Unlike large corporations, small firms tend to evolve an entrepreneurial rather than a bureaucratic management style. In such companies, "developing ideas and innovations into useful products and taking big risks are a way of life," the speaker noted.

But despite small business' substantial contribution to society, it receives precious little technological or management aid from other sectors of the U.S. economy, Norris complained.

Government and university laboratories, for example, "constitute enormous reservoirs of technology," he said. But little of that knowledge is ever transferred to small firms and even less is translated into new products and services.

Another place where potentially valuable technology often goes unused is big business, Norris added.

"Most firms use only part of their store of technology in their own commercial activities, but the remaining unused technology may have commercial application elsewhere," he said. "Even more importantly, firms utilize technology in one product that may have applications to other products."

'Let's See Now — Didn't You Just Get a Raise in 1965?'

CDC Offers Stock Plan

MINNEAPOLIS — Control Data Corp. is offering a new stock purchase plan that allows investors to make periodic cash investments toward the purchase of CDC common stock and to reinvest dividends toward the purchase of additional stock.

Control Data common stockholders are eligible to participate in the plan. Anyone who is not now a CDC common stockholder may become a participant by making a $50 investment at the time of enrollment.

CDC will pay all service and brokerage fees and commissions for stock purchased through First Trust Co. of St. Paul, Minn.

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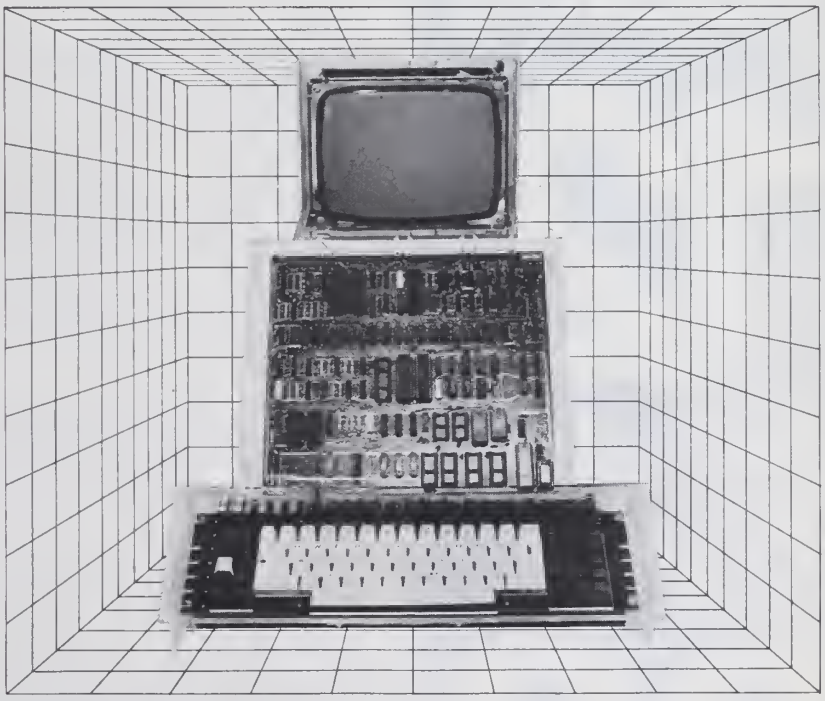

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Congressman Calls for More Federal Use of DP

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Federal government, strangling in paperwork and red tape, is in dire need of advanced technology from the data processing industry, Rep. Frank Horton (R-N.Y.) told a group of industry and government executives here recently.

"The federal government is overwhelmed with data" and "must turn to automation in order to gain efficiency," Horton said in a Nov. 15 address to a joint meeting of General Services Administration officials and members of the Computer and Business Equipment Manufacturers Association.

Federal agencies are guilty of "mismanagement of information resources," he said, but "the blame really is on Congress for failing to adequately perform its government oversight function and for passing laws requiring increased government information gathering."

'Put Own House in Order'

Declaring that "the government is strangling," Horton said that "we need to put our own house in order" by first recognizing that "the management of information resources is a responsibility of the federal government" and then moving to procure the technology which agencies need to efficiently manage those resources.

Congress is becoming more and more aware of the problem, he continued, and is now very interested in streamlining federal procurement of data processing equipment and services.

The House Government Operations Committee, of which Horton is the ranking minority member, realizes the DP industry has "a major role to play" in helping agencies "avoid abuse, waste and mismanagement of the tax dollar," he said.

Federal agencies, which Horton said will spend an estimated $5 billion for DP equipment and services in fiscal 1980, should start looking at the total system cost of their procurements and stop concentrating so much on hardware expenses which, according to Horton, constitute only 20% of a system's total cost.

Also, "we need to speed up the procurement of [DP] technology so that the government can obtain the latest in technology." Horton said government regulations have so inhibited industry-government relations that "the business community is disillusioned and afraid to do business with the government."

According to Horton, a member of the Commission on Federal Paperwork, excess government regulation and paperwork is "squeezing the life out of industry," with the burden of extraneous paperwork amounting to a $100-billion-a-year problem for industry and agencies.

Mart for WP To Grow 35%, Report Predicts

CUPERTINO, Calif. — Domestic shipments of word processing (WP) workstations will increase from approximately 69,000 units in 1978 to nearly 307,000 units in 1983, a compound annual growth rate of nearly 35%, according to a study by Dataquest, Inc.

This projected increase is in contrast to a 27% compound annual growth rate for the 1973-78 period.

Total U.S. revenues from rental and outright sales of word processing equipment — other than supplies and services — is expected to grow from about $860 million in 1978 to nearly $2.4 billion in 1983, a compound annual rate of about 22%.

The Dataquest report also indicated that a substantial shift in the mix of products demanded by the marketplace and the relative fortunes of the current major manufacturers will occur.

By 1983, half of all deliveries will be of the half-page display variety — up from less than one-third in 1978. Dataquest expects one-line and full-page displays to grow dramatically in shipment size and revenue and units with no displays to decline substantially in demand.

Dataquest is located at 19055 Pruneridge Ave., Cupertino, Calif.

6 Major Topics

12 Industry Experts

20 Years of Data Processing

As Computerworld looks back at the 70's and ahead to the 80's in our Year End Wrap-Up Issue.

According to E. Drake Lundell, Jr., editor of **Computerworld,** this special decade-ending Wrap-Up Issue is "designed to be read thoroughly, not just glossed over and shelved." We'll do this by focusing on six major topics of current high interest to users, with selected industry experts covering each topic. One expert will look back a decade, and another will write on the future. Here are the details.

Technology — As the (by now) well known saying goes, "If the auto industry had done what the computer industry has done in the last 30 years, a Rolls-Royce would cost $2.50 and get 2,000,000 miles per gallon." We won't go back 30 years, but one of our experts will look back at the 70's, while another will look ahead to the 80's and what we can expect in the way of technological changes and their impact on data processing.

Minicomputers — Did you know that Computer Control Corporation was the world's leading minicomputer company back in 1970? Do you know what happened to them? The minicomputer has come a long way in the last ten years. One of our industry experts will look at how far it has come, while another will examine its future.

Medium to Large Systems — We've gone from tubes to transistors to large scale integration to very large scale integration. And the changes have been dramatic. Our experts will look at both the past decade and the coming decade to show you just how dramatic those changes have been.

Software — Nothing in the computer industry has been the butt of more jokes than "software" and all the images that word conjures up. But as we've all come to know, "software makes hardware happen" — and it will be increasingly important in the next decade . . . We'll also look at its development through the past ten years.

DP Operations — In 1970, "distributed data processing" was unheard of. Large central systems were the order of the day. We still have large centers of course, but we have a lot of other things as well. As DP has become a more integral part of the organizations it serves, DP Operations have become much more complex. Experts will look at both the past and the future.

Communications — It wasn't very long ago that the key to computer communications was the person who carried the punch cards from one office to another. So there's a lot of change to review — and a lot more to come in the 80's. Two experts will look at this aspect of data processing.

PLUS . . . We'll have short articles from industry leaders, both old-timers and young up-and-comers . . . and we'll take a humorous look at some of the predictions the experts were making back in the 70's and how they came out. (We'll also look at some predictions that were missed, like the microcomputer explosion.)

This could be the most important issue of **Computerworld** this year. If you want to find out what has been so you can better guess what will be; don't miss our December 31st issue. And if you market products or services in the computer field, you'll want your ad there. Closing date is December 14th. Your **Computerworld** representative can give you complete assistance in ad planning. Or, to reserve space for your ad, call Frank Collins at (617) 965-5800.

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PHOENIX

PROGRAMMER ANALYSTS

Major bank data processing company has need for programmer/analysts with experience in COBOL, OS JCL, and TSO. Competitive salaries and excellent growth potential.

Roc Rogers
ROBERT HALF
of Phoenix, Inc.
3550 N. Central Ave. #1504
Phoenix, AZ 85012
(602) 264-6488

SOUTHERN CALIFORNIA

PROGRAMMER ANALYSTS

Major financial company requires 3 plus years OS COBOL. Any IMS experience a plus. Starting salary to $25,000.

EDP CONSULTANT

International CPA firm has requirements for several qualified EDP professionals. 4 yr. degree + solid system design exper. CPA a plus. To $35,000 + bonus.

INVESTMENT SYSTEMS

Large insurance company needs a supervisor of the investment systems area to supervise 8. Investment experience a must. To $35,000.

Contact Duncan White
ROBERT HALF
of L.A. and Orange County
3600 Wilshire Blvd., Ste. 1914
Los Angeles, CA 90010
(213) 386-6805
6272 E. Telegraph Rd.
Commerce, CA 90040
(213) 721-2197
2333 N. Broadway, Ste. 200
Santa Ana, CA 92706
(714) 835-4103

DENVER

IMS

Large Denver based financial organization needs a data base analyst with IMS internals exp. Must be familiar with all aspects of data base internals, utilities, and backup procedures. Excellent opportunity to work in the lead position on a pilot data base project. Start $30,000 to $35,000 range + top benefit package.

SYSTEMS ANALYST

Excellent career opportunity with Denver division of large NYSE corp. for a systems analyst with proven design ability. Must have prior programming knowledge and the ability to solve user needs. Start $23,000 to $26,000 range.

There are many other good career oportunities currently available in the Rocky Mt. area. If you are interested in obtaining more information please contact:

Steve Newman
ROBERT HALF
of Denver, Inc.,
2 Park Central
Denver, CO 80202
(303) 629-1010

DAYTON

INTERNAL SYSTEMS CONSULTANT

This opportunity is for an individual w/Data Base exp., as well as extensive exp in bus. & technical design of manufacturing systems and the related business responsibilities. A degree is pref. Reporting directly to the Corp Manager of Data Processing, the candidate will be working with all types of business systems, but the assignments will involve MRP, shop scheduling, inventory control etc. Lge IBM 370/148/OS/VS1 with IMS data base.

Salary $22-24.5K

PROJECT LEADERS

Major Mfg is seeking indiv with excellent verbal & written skills to act as liaisons between their data processing and fin'l areas. Extensive exp with business appli- and large IBM mainframes are preferred. Advanced degree is a plus but not essential. Indiv's who enjoy a small town environment located near major recreational facilities are asked to respond.

Salary $25-30K

PROJECT LEADERS

Dayton div of a major Fortune 500 seeks a candidate who is promotable to Systems & programming Mgr. Exp with lge IBM mainframes in a manufacturing environment is preferred. Firm is upgrading to a 4341 series by September 1980. MBA is pref but not essential if you have good user skills. Demonstrated leadership skill is a must.

Salary $18-22K

Don Novak
ROBERT HALF
of Dayton, Inc.
First National Plaza
Dayton, OH 45402
(513) 224-0600

SAN ANTONIO

SR. PROG. ANAL.

Degree. 5 yrs + exp in job position. V/M 370. ACP Based System. Verbal and written communication skills. Prior airline exp plus. Discount travel benefits. Standard work week. $37,000.

SYSTEMS PROGRAMMER

2 yrs + exp. VS1-VM-CICS Know APL & DMS. IBM/3033 Progressive DP environment. Multi tasking Service Bureau. Standard benefits. $26,000.

EDP MGR.

10 yrs. + exp. DP and NCR systems. HW-NCR 8450 VRX Cobol and Neat III CIF customer banking file. Substitute IBM Banking on-line exp. New installation, select own staff. $26,000.

PROGRAMMER ANALYST

2 yrs + exp. in Fortran and APL. Know CMS. SPSS, PL/1 a plus. IBM 3033 Progressive DP environment. Administrative and accounting applications. Career path position. Benefits. $24,000.

PROGRAMMER ANALYST

BBA 2 yrs + Utility acctg, MIS. Cobol and Fortran langs. HW-IBM 3033, Amdahl 470, mini DOS. Good communication technician. Assy lang ++. Mfg environment COLA advantage. Promotable type. Excellent co. $22,000.

Leon Stief
ROBERT HALF
of San Antonio, Inc.
First Nat'l Bnk Bldg #340
San Antonio, TX 78201
(512) 736-2467

Work where you want to work. Seventy offices throughout the United States, Canada and Great Britoin.

LOUISVILLE

DATA BASE ADMINISTRATOR

Large Ky. firm looking for a DBA to select Corp. Data Base system. Experience in either IDMS, IMS or total. Company will move quickly for this new position, will be #1 person. New equipment on order, lots of exposure and challenge. Excellent benefits. Salary to $30,000.

OPERATIONS MGR.

Central Ky. client looking for operations manager for large 370/OS and shop. Will Supervise 20 to 25 people. Degree not necessary. Excellent benefits. Will pay relocation. Salary to $31,000.

D.P. MANAGER

Southern Company looking for a D.P. Manager for their Mfg. plant. Systems 3/15D CCP. Knowledge of DBA and MRP. Opening due to promotion. Good relocation policy. Salary to $30,000.

ROBERT HALF
of Louisville, Inc.
680 S. 4th St.
Louisville, KY 40202
(502) 585-1751

BOSTON

PROJECT LEADER

Fast growing consumer goods mfr. seeks "shirtsleeve type" hands-on proj. ldr. to direct small staff. IBM 370/148 OS/VS, COBOL, fin'l. sys. environ. Will implement new projects only. Salary $26,000.

LEAD COBOL PROG.

Internat. R&D org. requires senior COBOL specialist to design, code & implement state-of-the-art bus. sys. IBM 370 OS, COBOL environ. Will be promoted to proj. ldr. within yr. Salary $22,500 to start.

MIS MGR—MAINE

Leading freight transporter requires forward thinking & career-oriented indiv. to manage entire EDP staff. Familiar with lge. scale IBM & DEC hardware pref. Interview & reloc. exp. pd. Beautiful country setting. Salary $25,000.

SR. SYS. ANALYST

Innovative & developing fin'l. services org. seeks sys. designer/liaison for implementation of new batch & on-line sys. State-of-the-art IBM environment. Hi-visibility to top execs. Salary $25,000.

SYSTEMS PROGRAMMER— N.H.

Major instrument mfr. requires hvy. sys. prog. to implement OS. IBM 370 OS/VS, CICS & telecommunications exp. pref. Will be corner building block for all future development. Salary $26,000.

Contact Gerry Battista
ROBERT HALF
of Boston, Inc.
100 Summer St.
Boston, MA 02110
(617) 423-1200

PROVIDENCE

SYSTEMS PROGRAMMER

Prestigious local bank seeks strong track record in IBM 370 OS CICS shop. High visibility for effective communicator $25,000.

PROJECT LEADER

Outstanding career opportunity with this well known Insurance Co. IMS/IDMS/TOTAL expertise necessary $25,000

D.P. MANAGER

Relocate to R.I. and a fast paced manufacturer. IBM 370 to be converted to IBM 4331. Must have strong COBOL and Supv. skills. $25,000

PROGRAMMER ANALYST

Growth to System Design assured in medium size manufacturing shop IBM 370/135 just installed, COBOL expertise & aggressive attitude leads to project leadership. Relocation paid.

$22,000

Dee Ecker
ROBERT HALF
of Providence, Inc.
400 Turks Head Bldg.
Providence, RI 02903
(401) 274-8700

HARTFORD

MGR. SYST./PROG.

Insurer seeking indiv. to direct all Prop./Casualty systems. Must possess mgmt. bkgrd. & have exp. with IBM products. Starting salary to $30,000+.

V.P. DATA PROG'G

Sr. Exec. position for E. coast insurer to direct all D.P. functions. A unique oppty. to direct large staff in growing industry. Salary to $38,000.

EDP INSTRUCTOR

Conn. oppty. with IBM installation to move into prof. environment developing & presenting state-of-the-art analysis & prog'g. courses. Salary to $26,000.

PERFORMANCE SPEC.

New local oppty. with major firm for indiv. with HARDWARE/SOFTWARE performance evaluation exp. Prefer indiv. with distributed D.P. bkgrd. Mini & large scale environment. Salary to $26,000.

SYSTEMS PROG.

Conn. multi-div. co. expanding on-line systems. Exp. in IBM's T.P. software products; i.e. TCAM, VTAM, etc. qualify for this excellent opty. Salary to $30,000.

SYST. PROG.

Conn. opening for indiv. to direct conversion from DOS to MVS. Exp. in CICS, VM-370, DL-1 helpful. Excellent suburban location. Salary to $29,000.

Stan Durbas/Paul Meissner
ROBERT HALF
of Hartford, Inc.
111 Pearl Street
Hartford, CT 06103
(203) 278-7170

BUFFALO

SYSTEMS ANALYST

International consulting firm needs savvy systems pro for expanding Western NY area. Ideal background includes manuf. orientation with small scale hardware. IBM Sys 3, 32 or 34 is best. Proven ability to work with little supv. is key. Outstanding peer group. $25,000

PROJECT MANAGER

Division of leading industrial needs project mgr. with manuf. expertise. Major resp. will be design & implementation of an inventory/order entry & data collection system. Multi plant orientation helpful. Will direct staff of programmers & analysts. Position leads to plant level mgmt. $33,000

SYSTEMS ANALYST

High technology manuf. co. located in southern tier of NY State needs analyst to take charge. Manuf. or financial systems design & implementation exp. best for commercial systems area. RJE to dual 370/OS installation. Openings due to promotions. Reports directly to mgr. of systems & programming. $25,000

D.P. MANAGER

Management pos. for present shirtsleeve manuf. supv. Co. presently is working with service bureau and anxious to bring data processing in-house. Track record must include hardware/software evaluation, design & implementation of a wide range of applications plus solid mgmt. skills. Position rpts. directly to controller. $30,000

Paul Siegal
ROBERT HALF
of Buffalo, Inc.
1310 Liberty Bank Bldg.
Buffalo, NY 14202
(716) 842-0801

ROBERT HALF

NEW ORLEANS

SYSTEM ANALYST

State-of-the-art shop. Energy related firm. 1+ year design exp with some programming. Relocation paid. To $24K

TECHNICAL ANALYST

Multi-million $$ firm. 1+ yrs. system prog. exp. Exposure to IMS or TOTAL. Relocation paid. $16 to $21K

PROJECT MANAGER

Multi-million $$ firm. 2+ yrs exp in banking. IBM/COBOL/VS/IMS background. Relocation paid. To $30K

SR. SYSTEMS ANALYST

Int'l mfg. firm. 2+ yrs COBOL. Excellent benefits. Relocation paid. To mid $20's

Jerre Brown
ROBERT HALF
of Louisiana
135 St. Charles Ave.
New Orleans, LA 70130
(504) 524-3773

ALBUQUERQUE

NCR

Major New Mexico company seeks Asst. DP Manager. NCR 8450 in Cobol, Neat 3. On-line. $25,000 range.

SYSTEMS PROG

Several New Mexico companies seek system programmers. IBM 370 OS and DOS in Assembler and Cobol. CICS a plus. $20,000 range.

Dick Starnes
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of New Mexico
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Albuquerque, NM 87190
(505) 884-4557

Specializing in E.D.P. positions (not just jobs). Seventy offices throughout the United States, Canada and Great Britain.

MILWAUKEE

DP MANAGER

Ready to manage your own S/34 shop with RPG II programming? Do you know manufacturing/financial systems design and implementation? Any OCL and CCP experience is a plus. $22-27,000

PROJECT MANAGER

Have you been overlooked long enough? Ready to supervise others in the areas of financial/accounting systems development? This is a large COBOL state-of-the-art manufacturing environment. $22-30,000

Dave Weiner or Stan Mundro
ROBERT HALF
of Wisconsin
777 E. Wisconsin Ave.
Milwaukee, WI 53202
(414) 271-9380

SEATTLE

PROGRAMMER ANALYST

Many openings for experienced veterans of small and large installations in the healthy economies of Washington, Oregon, Idaho and Alaska. Banking, Insurance, Forest Products Distribution . . . Visiting here? Call me collect to discuss jobs and set up interviews.

Ray Magill
ROBERT HALF
of Seattle, Inc.
1301 5th Avenue, Suite 2626
Seattle WA 98101
(206) 624-9000

CLEVELAND

GROUP MANAGER SYSTEMS AND PROGRAMMING

You will be responsible for planning, scheduling, hiring, whole gamut. You will be technically oriented; up through the ranks with on-line exposure, and/or DB with 5-8 years of experience in D.P. Equipment is Itel, DOS/VS. $30,000.

PROGRAMMER/ANALYST

Fortune 500 company seeking your experience in systems design and programming. You must have RJE and JCL experience in an OS/MVS environment, with at least 3 years of experience in COBOL. $21,600.

PROGRAMMER/MANAGER

Are you an analyst type person? If so, this position will lead to manager of D.P. department. Fortune 200 company is offering you a challenge if you have some accounting, manufacturing, and inventory experience with 3-5 years of experience on Systems 3 or 34. They want you to set up a system and supervise 5 people in the department. $25,000.

Partial Listing

ROBERT HALF
of Cleveland, Inc.
1367 East 6th Street
Cleveland, OH 44114
(216) 621-0670

MINNEAPOLIS

MANAGER OF SYSTEMS

Fast-growing company has new position for top-level mgr/analyst with mfg bkgd. Duties are systems evaluation, and supv'g 4 S/A RPG II a must. This fine firm on the MN/Dakota border offers paid relocation. Salary flexible to low 30's.

PROGRAMMER ANALYST

Phenomenal growth has opened a programmer/analyst position within successful mfg company. Systems 3, RPG II environment. Co. will relocate. Low to mid 20's.

TECHNICAL SUPPORT

Prominent Mpls firm needs individual with Hewlett-Packard Technical support bkgd utilizing computers in plants & corporate offices. On-line exp in data communication necessary. Salary to $27,000.

CHIEF PROGRAMMER

New position with mgmt potential. Solid Twin City firm acquiring in-house compiler needs the specialist with 2-3 yrs exp translating languages into machine language. Company will relocate. Salary to $27,000.

Kathi Grant
ROBERT HALF
of Minnesota, Inc.
2236 IDS Center
Minneapolis, MN 55402
(612) 339-9001

BALTO/ WASH

INSURANCE SYS. MANAGER

Life Insurance exp. and degree req'd for this exciting position. Broad range of responsibility including supervision and budget handling. Large, forward looking organization offers excellent benefits plus paid relocation. OS/MVS, TSO, CICS. 30K

ROBERT HALF
of Baltimore
217 The Quadrange,
Baltimore, MD 21210
(301) 323-7770

ROBERT HALF
of Washington
7316 Wisconsin Ave.
Washington, DC 20014
(301) 652-1960

ST. LOUIS

MANAGEMENT ANALYST To $27K

SUPER OPPORTUNITY with one of the most respected firms in St. Louis. At least 1 yr. profit-impact analysis, MBA or equivalent. Identify, conceptualize, develop, implement and evaluate performance of corporate systems TOP MANAGEMENT VISIBILITY - INCUMBENT PROMOTED!

REMOTE SITE MANAGER To $40K

Responsible for management and coordination of remote computing sites for division of Fortune 25 firm located in the Southeast. Will function as Asst. MIS Director; have varied assignments. At least 8 yrs. EDP experience with 2 yrs. at manager-level.
MUST BE GROWTH ORIENTED!

APPLICATIONS PROG/ANALYSTS SOFTWARE PROGRAMMERS To $28K

Top financial organization seeks "pros" for expanding DP Shop. Degree, 1 or more yrs. experience in OS/VS-MVS environment.
EXCELLENT COMPENSATION PACKAGE!

SYSTEMS ANALYST To $18K + Bonus

2 yrs. COBOL, manufacturing experience qualifies you for this corporate analyst position with EDP oriented aggressive firm in medium-size Missouri city. Converting from NCR to IBM hardware. 20% prog.
GROW WITH COMPANY!

ASSISTANT DP MANAGER To $24K

Supervise large NCR shop in scenic rural community. LARGEST FIRM IN ITS INDUSTRY! 5 yrs. DP experience, with management responsibility/exposure for design, programming and operations.
EXPANDING SHOP!

CONSULTANT To $28K

Consult with clients of respected EDP Services firm. At least 1 yr. experience as programmer/analyst, degree required. Large IBM exposure preferred.
GO WITH A LEADER!

PROGRAMMER/ANALYSTS To $28K

At least 1 yr. experience in either COBOL, BASIC, FORTRAN, PL1, RPGII, BAL. Heavy user contact, development positions, small to large firms; equipment. WE WILL MATCH YOUR SPECS!

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7733 Forsyth Boulevard
St. Louis, MO 63105
(314) 727-1535

MIAMI

DATA BASE ANALYST

Billion dollar Fla. Corp. seeks IMS specialist. IMS design, security, back-up and recovery, systems performance monitoring. Full range benefit package. Self-motivation and ability to show resourcefulness will point the way to management position. Relocation and interview expenses paid. Salary to 30K.

Chuck Nell
ROBERT HALF
of Miami, Inc.
1395 NW 167th St.
Suite 100
Miami, FL 33169
(305) 625-5433

DALLAS

The demand for EDP professionals continues extremely high in the Dallas area. We have immediate openings at all levels . . . salary ranges. All fees, interview, and relocation expenses are completely paid for by our client companies . . .
Below are a few of the large variety of positions (many exclusively ours) currently available:

IMS . . . . To $30,000
Manufacturer . . . seeking their first IMS/VS internals specialists . . . 3032's . . . solid technical staff in North Dallas . . . opportunity to do it right the first time.

SYSTEMS ANALYST . . . . To $29,000
NYSE manufacturer planning to implement a new DDP manufacturing/warehousing system with minis and IBM host . . . Lots of professional growth here.

TECH SUPPORT SPECIALIST . . . . To $28,000
Oil & gas company . . . 303X's - MVS - JES2 - TSO - IMS/VS - NCP/ACF - VTAM/ACF, etc. . . . good career opportunity

PROJECT LEADER . . . . To $26,000
International manufacturer . . . seeking senior programmer/analyst ready to assume a project leader position in manufacturing system . . . 3033's - COBOL - IMS - TSO.

PROJECT MANAGER . . . . To $25,500
Insurance Co . . . manage the evaluation/Implementation of larger scale life Insurance packages . . . 370 158- DOS/VS-COBOL . . . full responsibility level.

SENIOR PROGRAMMER ANALYST . . . . To $25,000
Far North Dallas manufacturer... Large IBM shop . . . professional long term career environment with a fast growth NYSE firm . . . 3 new openings (2 manufacturing & financial app.)

SR. PROGRAMMER/ ANALYSTS . . . . To $23,000
National consumer goods co. with 370/158-DB/DC has opening for aggressive user oriented professional...Good growth situation.

Call or send your resume, on a STRICTLY CONFIDENTIAL basis to:

Ron Urbach
Two Northpark East
Suite 750
Dallas, TX 75231
(214) 363-3300

COLUMBUS

ON-LINE ANALYST

Columbus based company involved in creation of state and national teleprocessing network has visible position available. Reports to asst. v.p. For success of project, position requires knowledge of Assembler O.S. plus desire to work with select group of "on-line" professionals. Reloc. paid. Salary $18-24,000.

PROGRAMMER/ANALYST

When you join this Fortune 50 company you'll match minds and talents with seasoned professionals while being a vital member of an on-line development team. You'll receive full medical, dental and 100% tuition reimbursement and annually attend two weeks state of the art classes on Ivy League campus. If you have one or more years of COBOL/OS experience and demand the best from your working environment, we welcome discussing this position with you. Suburban location. Salary $18-24,000.

Kasie Alexander
ROBERT HALF
of Columbus
88 E. Broad Street
Columbus, OH 43215
(614) 221-9300

SAN FRANCISCO Bay Area

EDP PROFESSIONALS...Here is a partial listing of the many positions currently available with our clients. call collect or send your resume in confidence.

EDP AUDIT SPECIALIST

Demonstrated knowledge of EDP at the system level. Define spec's for audit packages in new and existing systems. Finance/Banking background preferred.

COBOL PROGRAMMER ANALYST

(Senior) For IBM 303x IMS environment. New system development projects in the works.

RPG II PROGRAMMER ANALYST

Wanted for sophisticated System 3 shop. Financial applications experience required.

ANALYST/TIME SHARE

Experience in time share, mini operations support with heavy programming in Mini's. Excellent client/user skills needed along with presentation experience.

TELEPROCESSING ANALYST

Three to five years in IMS Terminal operations. Good documentation and user contact skills. Some programming would be preferred.

DP CONSULTANT

Position requires three to six years experience in the design and evaluation of systems coupled with excellent oral and written skills. Professional environment with excellent management potential.

SR. SYSTEMS PROGRAMMER

Will install new packages and releases. On line environment. IBM 370/158 DOS-CICS/VS, POWER/VS. Will be the systems programmer for this progressive financial institution.

Jerry Anderson or Bob Couch
ROBERT HALF
of Northern California
EDP Specialists
111 Pine St.
San Francisco, CA 94111
(415) 434-1900

Rich Abreau or Jim Dupre
ROBERT HALF
of Northern California
EDP Specialists
2 Palo Alto Sq. #920
Palo Alto, CA 94304
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Amy Nielson
ROBERT HALF
of Chicago, Inc.
35 E. Wacker Dr.
Chicago, IL 60601
(312) 782-6930

KANSAS CITY

ASSISTANT DIRECTOR

Kansas City based distributor desiring to move quickly needs a proven planner and director of new systems development. Must be capable of installing structured techniques and guiding an on-line data base application. High visibility exists to major corporate executives. Must have prior proven project development. Salary to $35,000.

D.P. MANAGER

Recently acquired subsidiary of Fortune 100 company seeks a D.P. Manager. Must be capable of coming in and taking over a System III model 15 d shop with CCP installed. The ability to dig in and document and bring systems and standards up to date is essential. Job reports straight to the General Manager. Salary to $30,000 with a management incentive program.

EDP AUDIT

Publicly held fortune 100 company based in the midwest is establishing their first EDP audit function. Person selected will establish the department. Position requires a minimum of two years of previous EDP Auditing experience or two years public accounting with managment service experience. Salary to $30,000.

SYSTEMS PROGRAMMER

Kansas City state of the art installation needs a lead software programmer. The shop requires two years OS internal with six months experience in generation, maintenance and tuning of MVS. Opportunity exists to work with a large D.P. network with both local and remote terminals under IMS DB/DC. Salary to $28,000.

DATA CENTER SUPERVISOR

Midwestern 3033 installation needs a proven supervisor for their data center. Person will be responsible for 30 people on three shifts seven days per week. Ability to hire train and career path operational people is essential. Person will report to the Director of data processing. Salary to $25,000.

SENIOR PROGRAMMER/ ANALYST

Get involved in a top notch K.C. manufacturing concern looking for a person with two plus years experience in business applications. Opportunity to learn CICS and DLI as well as move in to Systems area. High visibility. Present configuration is 370/148 DOS/VS and moving up. COBOL is essential. Salary to $24,000.

PROGRAMMER ANALYST LEARN IMS

Nationally based Kansas City firm has announced major staff expansion for 1980. Multiple openings exist for programmers with a minimum of two years of OS/COBOL experience and project leaders with heavy inventory control. Salary range $18,000 to $27,000.

George Waterman
ROBERT HALF
of Kansas City
127 West 10th Street
Kansas City, MO 64105
(816) 474-4583

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SENIOR PROGRAMMER/ ANALYST

Requires a minimum of 4 years experience with some Check Processing background. Responsibilities include: project planning, systems analysis and design, documentation, coding, and developing integrated test plans. The position requires a strong background in BAL as well as good communication and user interface skills, plus experience in any of the following areas: CPCS Software, Bulk Filing, POD, Float Analysis, or 3890 SCI language.

PROGRAMMER/ANALYST

Requires a minimum of 2 years programming experience with heavy emphasis on BAL. SCI language experience is highly desirable. Position responsibilities include program design, coding, integrated testing, and software documentation.

Qualified candidates please send your resume, including salary history, to:

STA-19
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Suite D-20
P.O. Box 14
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215-565-2920

Systems Personnel Inc.

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The lifestyle ahead of you at NCR/Millsboro includes beaches, boating, wildlife preserves, fine company recreational facilities, and enviable cost of living advantages. You'll have small town advantages, yet Washington, Baltimore and Philadelphia are within easy reach.

Investigate these immediate openings promptly:

SOFTWARE DESIGN
- Operating Systems Design
- Microprocessor Software-Assembly Language
- SDLC Communications Protocols
- I/O Drivers
- Diagnostics

SYSTEMS ENGINEER
- Next generation point-of-sale product investigation
- Systems software integration testing
- Communications standards implementation
- Hardware, software technology break-in investigation
- Communications oriented operating system

APPLICATIONS PROGRAMMING
- Grocery Store
- General Merchandise
- Hospitality
- State Liquor Store

MODULE DESIGN
- Scanning
- EFT (Electronics Funds Transfer)
- Price Look-Up
- Data Capture
- Electronic Weight Scales

DEVELOPMENT ENGINEER
- Microprocessor Experience—8080
- LSI & MSI Design

LSI DESIGNER
- Custom LSI in MOS Technology
- Experience with CAD

R & D COMPUTER CENTER— SECTION HEAD
- PDP 11/70 or 11/40 Computer Experience
- RSX-11D and IAS Operating Systems

EMI/ESD ENGINEER
- Design & Measurement For Control of EMI/ESD
- VDE & FCC Regulations

COMPONENT ENGINEERS
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- Prepare Components Qualification Test Procedures
- Program ATE for Device Characterization
- Reliability Prediction and Failure Analysis

QUALITY ENGINEERS
- Vendor Quality Management
- Components-Specification & Product Design
- Computer Automated Tests for Evaluating Software

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* * *

TSI has never stopped growing. New products, new offices, and new opportunities are a way of life here. But the best part is that with all our growth everyone at TSI still feels they're on the ground floor of something big. That's a great feeling. It's something that very few companies have to offer. TSI now has the following positions available in: Norwalk, CT. ★ Atlanta, GA. ★ Lombard, IL. ★ Denver, CO. ★ Los Angeles, CA. ★ Los Gatos, CA. ★ London ★ Paris ★ Munich.

Our openings:

Sales Representatives
You'll have commission sales responsibility for all of our products. A background in selling to the data processing community is essential. If you're successful now at selling software, you're an ideal candidate.

Sales Support Representatives
You'll help install our products and train our customers in their use. Career paths in both sales and technical areas will be open to you. If you're a "people person" and have a data processing background, we'd like to talk to you.

Customer Service Representatives
You'll provide in-depth technical support for our customers. This position is for the problem-solver who likes the feedback that comes from making customers happy. Requires proficiency in IBM Assembler and working knowledge of COBOL, PL/I, OS, and DOS.

Technical Support Specialists
You'll be the product expert. You'll provide the centralized technical support needed to keep our products humming. You'll be the one we rely on when the tough problem needs to be solved. A good background in IBM Assembler and either DOS or OS job control is required.

Product Development Specialists
You'll create our new products. You'll design them, build them, test them, and then help them grow. This position will draw heavily on your technical skills which should include an extensive background in IBM Assembler and preferably on-line systems.

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The successful candidate will coordinate and optimize systems use with multi-departmental and multi-locational demands.

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Good fringe benefit package. Salary commensurate with qualifications and experience. Please forward resume and salary history in convidence to:

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Major responsibilities include working independently in analyzing user requirements, defining detail specifications, and programming in support of financial, project planning, engineering, purchasing and inventory systems. Minimum 3-5 years experience and a degree in Computer Science, Business Administration or Math preferred. Experience in TSO, TOTAL, IBM and on-line systems highly desirable.
- **PROGRAMMER/ANALYST**
Minimum 1-3 years experience with degree in Computer Science, Business Administration or Math preferred. Heavy experience with high level language, i.e., COBOL/FORTRAN, large computer, some user interface and program specification writing. Experience with structured programming, on-line systems, TSO, TOTAL and IBM highly desirable.
- **SYSTEMS & PROCEDURES ANALYST**
This position is a challenge for the right individual with a BS degree and 1-4 years experience in all phases of Manual Systems — including work flow analysis, detailed procedure writing, and maintenance of a forms control program. Interface with upper management also involved.

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Current projects include work in the following areas:

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- Data base management systems
- Customer service support
- Simulation and financial algorithms
- Expenditure analysis planning
- Demand forecasting systems
- Mathematical network modeling and simulation
- Configuration and traffic engineering of specialized voice/data networks
- Inventory management and control.
- Mini/microcomputer based systems
- Network Control

HUMAN FACTORS ENGINEERING

You will be responsible for human factors' engineering of computer-based information systems: analyzing, designing, and implementing materials associated with the interface between computer and user. You will interact with designers and users in specification, design and testing. Background should include advanced degree in human factors or industrial engineering, and/or equivalent experience. Academic training or background in computer systems is also desirable.

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- Minicomputer software. Prefer DEC (or other) systems, UNIX* operating system and/or C language
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John DePrima
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Or send resume to: John DePrima, Sperry Univac
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TECHNICAL SERVICES DIVISION

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LOCATION	PROJECTS/APPLICATIONS
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Washington, D.C. Suburbs	Various applications on Univac commercial and military computers. Projects include communications, simulation and Univac 1100 systems software.
Lexington Park, MD	Total systems support for Navy Command & Control and Tactical Data Systems. Work also involves scientific programming and the development and maintenance of government management information systems.
Dahlgren, VA	Software development services for the Naval Surface Weapons Center. Applications involve real time gunfire control and missile fire control systems and scientific programming.
Virginia Beach, VA	Software support for Naval tactical data systems. Operational and simulation programs utilizing various Univac military computers.
Dayton, Ohio	Univac 1100 systems software development and maintenance, Performance evaluation, EXEC 8 modification, SYSGENS, hardware/software problem isolation and customer consultation.
Orlando, FLA	Software development for real time communication systems utilizing Univac AN/UYK-20 minicomputer system.
West Point, NY	Conversion from Honeywell 6620 to a Univac 1122 computer system utilizing DMS-1100 data base management system.

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- Large IBM hardware experience in COBOL, PL1, and OSJCL. Exposure to PANVALET CICS, and data base management concepts a plus.
- Small IBM system experience in RPG, S-3, S-32, S-34, SERIES-1. Interested candidates should submit their resume and salary history to Herb Menard, Manager Application Planning and Development.

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General Products

Successful candidates will have total marketing responsibility for the product lines described below This will include promotion, pricing, product and business planning Your ability to work effectively with our development and field marketing personnel is essential. Sales, marketing or extensive user experience in combination with a technical degree and good presentation skills are required. MBA preferred.

SOFTWARE: You will direct the marketing of software products for our scientific/computational and real time computer systems. Experience with operating systems or scientific languages desired.

PROCESSORS: You will plan and execute programs for our future processor product lines.

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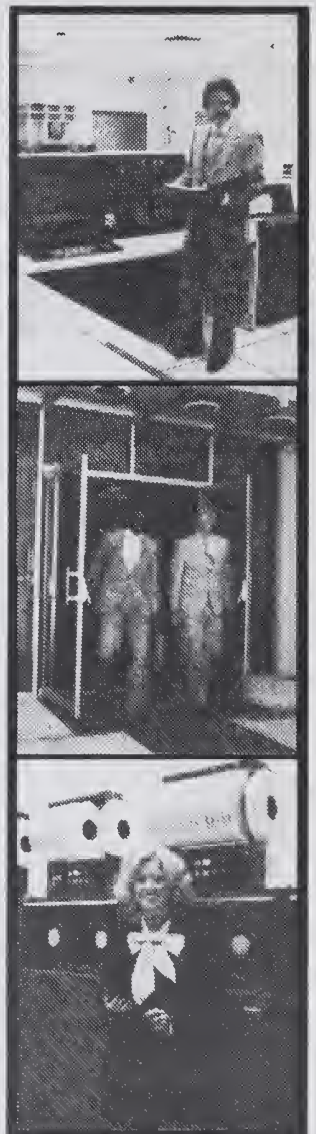

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APPLICATIONS

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DATA COMMUNICATIONS SPECIALIST - Candidates must have 1 to 3 years experience working with digital telecommunication equipment, such as lines, modems, and COMTENs or the equivalent front-end processors. Communication equipment installation and troubleshooting are an integral part of the assignment. Also we are seeking experienced individuals in the data communications field interested in participating in the design and development of satellite communications. Extensive knowledge of synchronous and asynchronous protocols is required. Familiarity with COMTEN software and/or satellite based transmission systems is a plus.

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Base salary ranges from $20K to $30K, depending on qualifications and experience, supplemented with a 20 percent differential and other allowances. Furnished housing and local transportation provided. Family to accompany. This is a Federal Government position, but is not in the career civil service.

Send resume or U.S. Civil Service Commission Standard Form 171 to:

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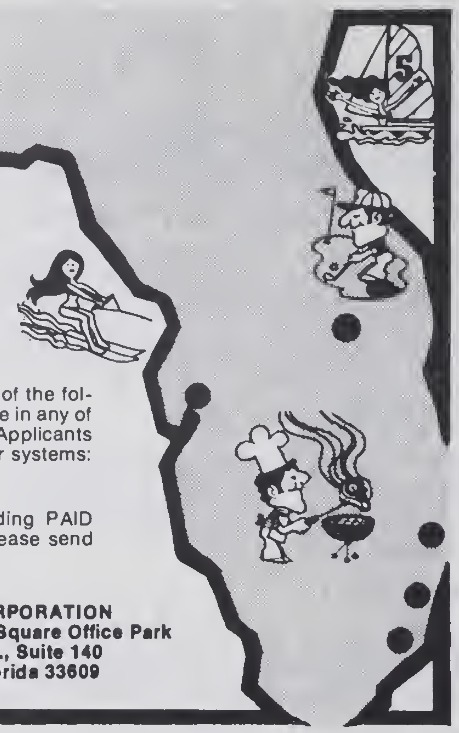

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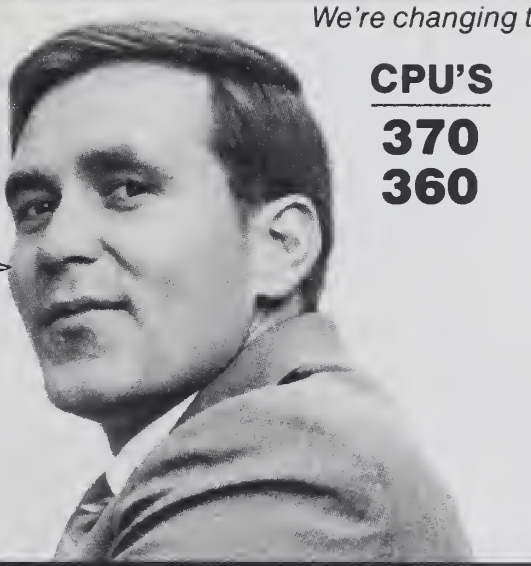

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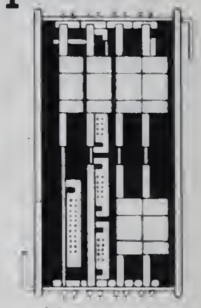

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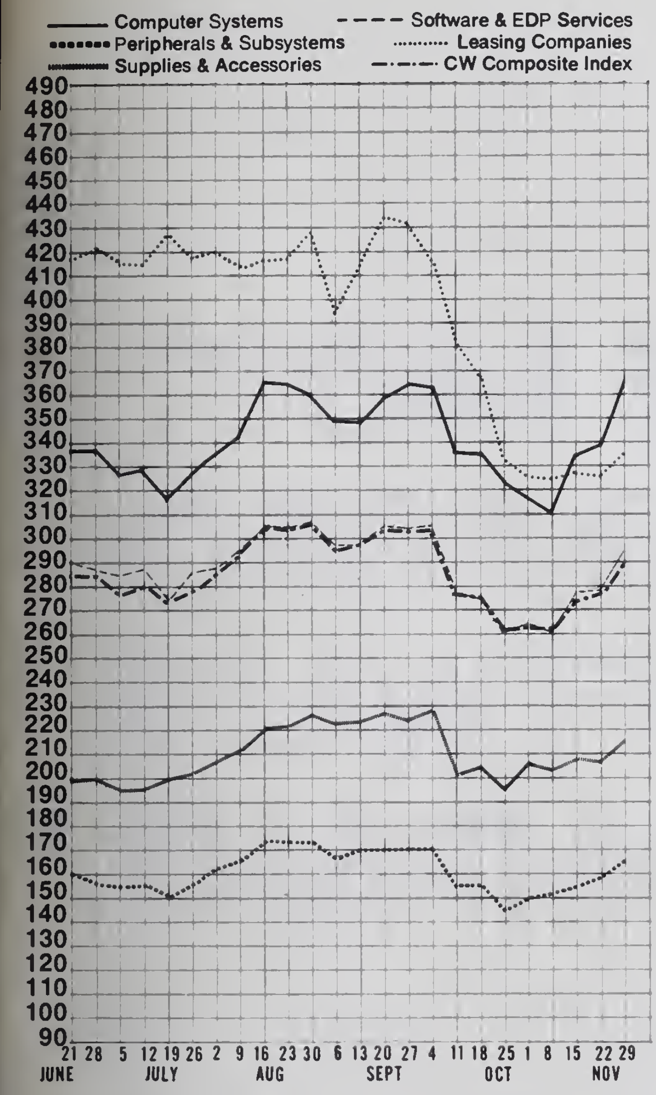

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, NOVEMBER 28, 1979

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COMPUTER SYSTEMS

EXCH		PRICE 1978-79 RANGE (1)	CLOSE NOV 28 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	17- 69	23 7/8	+4 1/8	+20.8
N	BURROUGHS CORP	59- 87	79 3/4	+5 1/2	+7.4
C	COMPUTER AUTOMATION	9- 44	10	+1	+11.1
N	CONTROL DATA CORP	23- 54	53 1/2	+5 7/8	+12.3
O	CRAY RESEARCH INC	8- 47	46 1/2	+2 1/2	+5.6
N	DATA GENERAL CORP	42- 74	55	+5 3/4	+11.6
N	DATAPOINT CORP	34- 97	95 1/4	+5 1/4	+5.8
N	DIGITAL EQUIPMENT	39- 69	67 5/8	+4 1/4	+6.7
N	ELECTRONIC ASSOC.	2- 13	6 7/8	+ 3/8	+5.7
A	ELECTRONIC ENGINEER.	9- 19	15 3/4	+ 1/2	+3.2
N	FOUR-PHASE SYSTEMS	19- 46	45 1/2	+5	+12.3
N	FOXBORO	28- 44	39 1/4	+ 5/8	+1.6
O	GENERAL AUTOMATION	7- 26	14	+ 3/8	+2.7
O	GRI COMPUTER CORP	1- 3	5/8	+ 1/8	+25.0
N	HEWLETT-PACKARD CO	24- 63	57	-2	-3.3
N	HONEYWELL INC	43- 83	79 1/8	+3 1/4	+4.2
N	IBM	62-321	65 3/4	+4 1/8	+6.6
O	MANAGEMENT ASSIST	9- 29	18 1/8	-1 1/2	-7.6
O	MANUFACTURING DATA S	9- 33	32 1/4	+2	+6.6
O	MINI-COMPUTER SYST	2- 8	3 3/8	+ 5/8	+22.7
C	MODULAR COMPUTER SYS	7- 18	11 3/8	+1	+9.6
N	NCR	37- 81	65 3/4	+3 7/8	+6.2
N	PRIME COMPUTER INC	9- 22	18 7/8	+2 1/8	+12.6
N	PERKIN-ELMER	17- 37	36	+ 1/2	+1.4
N	SPERRY RAND	33- 52	48 7/8	+2 3/4	+5.9
A	SYSTEMS ENG. LABS	11- 24	16 1/2	+1 1/2	+10.0
O	TANDEM COMPUTERS INC	13- 37	37 1/4	+3 1/2	+10.3
A	WANG LABS.	6- 30	29 3/4	+ 3/4	+2.5

LEASING COMPANIES

EXCH		PRICE 1978-79 RANGE (1)	CLOSE NOV 28 1979	WEEK NET CHNGE	WEEK PCT CHNGE
C	BOOTHE COURIER CORP	13- 21	17	- 1/2	-2.8
C	COMDISCO INC	3- 21	10	- 1/4	-2.4
A	COMMERCE GROUP CORP	1- 1	1/4	- 1/8	-33.3
A	COMPUTER INVSTRS GRP	1- 7	2 3/8	+ 1/4	+11.7
C	CONTINENTAL INFO SYS	3- 15	2 3/4	0	0.0
M	DATRONIC RENTAL	1- 4	2 1/2	0	0.0
A	DCL INC	3- 6	5 1/8	0	0.0
N	DPF INC	8- 14	8	+ 1/8	+1.5
N	ITEL	4- 36	5 3/4	+2 1/8	+58.6
N	LEASCO CORP	24- 55	52 1/4	+ 1/2	+0.9
C	LEASPAC CORP	1- 4	1/8	0	0.0
A	PIONEER TEX CORP	2- 7	2 3/4	- 1/8	-4.3
N	U.S. LEASING	12- 20	14 1/4	+ 7/8	+6.5

SOFTWARE & EDP SERVICES

EXCH		PRICE 1978-79 RANGE (1)	CLOSE NOV 28 1979	WEEK NET CHNGE	WEEK PCT CHNGE
C	ADVANCED COMP TECH	1- 2	7/8	- 1/8	-12.5
O	ANACOMP INC	8- 24	16 3/4	0	0.0
A	APPLIED DATA RES.	8- 17	9 5/8	+ 5/8	+6.9
N	AUTOMATIC DATA PROC	24- 40	38 1/2	0	0.0
C	COMPU-SERV NETWORK	5- 17	17 1/4	+4	+30.1
C	COMPUTER HORIZONS	1- 9	3 3/4	+ 1/2	+15.3
C	COMPUTER NETWORK	5- 16	5 3/8	+ 3/8	+7.5
N	COMPUTER SCIENCES	8- 17	16 7/8	+1 3/8	+8.8
C	COMPUTER TASK GROUP	1- 7	6 1/2	0	0.0
C	COMPUTER USAGE	2- 4	1 3/4	- 1/4	-12.5
C	COMPUT AUTO REP SVC	4- 10	5	- 1/8	-2.4
C	COMSHARE	6- 26	17 1/4	+ 1/4	+1.4
O	CULLINANE CORP	14- 33	26 1/2	+1	+3.9
C	DATA DIMENSIONS INC	1- 9	1 1/2	0	0.0
O	DATATAB	1- 4	1 1/4	+ 1/4	+25.0
N	ELECTRONIC DATA SYS.	15- 28	25 7/8	+2 3/8	+10.1
C	INSYTE CORP	1- 3	1 1/4	0	0.0
C	IPS COMPUTER MARKET.	2- 3	3	0	0.0
O	KEANE ASSOCIATES	3- 6	5 1/4	+ 1/4	+5.0
C	KEYDATA CORP	1- 4	3 1/2	0	0.0
A	LOGICON	10- 19	15 1/2	+1 1/4	+8.7
O	NATIONAL DATA CORP	7- 17	16 3/4	+2 3/8	+16.5
N	PLANNING RESEARCH	4- 10	6 1/8	+ 3/4	+13.9
O	PROGRAMMING & SYS	1- 1	3/4	- 1/8	-14.2
O	RAPIDATA INC	3- 7	4 1/2	+ 1/4	+5.8
O	REYNOLDS & REYNOLD	18- 36	29 1/4	-1 1/2	-4.8
O	SCIENTIFIC COMPUTERS	3- 9	8 1/2	+1	+13.3
N	TYMSHARE INC	18- 48	48 1/8	+3 5/8	+8.1
A	URS SYSTEMS	5- 8	7 1/8	- 1/8	-1.7
N	WYLY CORP	1- 7	5 1/2	+ 7/8	+18.9

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1978-79 RANGE (1)	CLOSE NOV 28 1979	WEEK NET CHNGE	WEEK PCT CHNGE
N	AM INTERNATIONAL	13- 32	14 1/4	+1 1/8	+8.5
N	AMPEX CORP	10- 19	19	+1 5/8	+9.3
C	ANDERSON JACOBSON	5- 13	12 3/4	+1 5/8	+14.6
N	APPLIED DIG DATA SYS	6- 22	8 7/8	+ 1/2	+5.9
O	BEEHIVE INT'L	3- 7	4 3/4	+ 1/4	+5.5
A	BOLT,BERANEK & NEW	6- 17	14 3/4	+1	+7.2
N	BUNKER-RAMO	10- 29	25 1/2	+1 1/2	+6.2
C	CAMBRIDGE MEMORIES	2- 9	1 5/8	0	0.0
N	CENTRONICS DATA COMP	16- 54	49 1/4	+1 3/4	+3.6
C	COGNITRONICS	1- 4	2	+ 1/8	+6.6
O	COMPUTER COMMUN.	6- 10	4 7/8	- 1/8	-2.5
C	COMPUTER CONSOLES	4- 17	17	+1 3/4	+11.4
A	COMPUTER EQUIPMENT	3- 6	4 3/4	+ 1/8	+2.7
C	COMPUTER TRANSCEIVER	1- 5	3 7/8	- 1/8	-3.1
C	COMPUTERVISION CORP	5- 49	49 3/8	+5 7/8	+13.5
N	CONRAC CORP	13- 26	16 1/2	+2 1/2	+17.8
A	DATA ACCESS SYSTEMS	0- 10	7 3/4	- 5/8	-7.4
A	DATA PRODUCTS CORP	13- 25	17 1/8	+ 1/4	+1.4
O	DATUM INC	2- 6	2 1/8	0	0.0
C	DECISION DATA COMPUT	2- 6	2 7/8	0	0.0
O	DELTA DATA SYSTEMS	1- 1	1/2	- 1/8	-20.0
N	DOCUMATION INC	6- 34	19 3/8	+2 5/8	+15.6
C	DATARAM CORP	6- 32	27 1/2	+2 1/2	+10.0
N	ELECTRONIC M & M	3- 9	3 1/8	- 1/8	-3.8
C	FABRI-TEK	1- 2	5/8	-	-8.2
C	GENERAL COMPUTER SYS	1- 3	1 3/4	- 1/4	-12.5
C	GENERAL DATACOMM IND	9- 21	18	+2 1/2	+16.1
N	HAZELTINE CORP	10- 20	20 1/4	+1 1/2	+8.0
N	HARRIS CORP	17- 36	32 5/8	+2 3/8	+7.8
O	INFOREX INC	2- 11	1 1/2	- 1/2	-25.0
C	INFORMATION INTL INC	7- 12	8 3/4	0	0.0
O	INFOTON	1- 3	2 1/2	+ 1/8	+5.2
C	INTEL CORP	26- 71	69 1/2	+1 1/2	+2.2
C	INTERSIL	7- 32	28 1/4	+ 1/2	+1.8
A	LUNDY ELECTRONICS	4- 8	6 3/4	+ 7/8	+14.8
C	MSI DATA CORP	6- 19	7 7/8	+ 1/8	+1.6
N	MEMOREX	18- 59	21 1/8	+1 1/4	+6.2
N	MOHAWK DATA SCI	6- 15	15 1/4	+2 3/8	+18.4
C	OMEX	2- 8	8 1/2	0	0.0
O	PARADYNE CORP	9- 23	22 7/8	+ 7/8	+3.9
A	PENRIL CORP	5- 12	11 7/8	+1	+9.1
N	PERTEC CORP	8- 17	16 3/8	+ 1/4	+1.5
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RECOGNITION EQUIP	5- 13	7	+ 1/4	+3.7
C	SCAN DATA	1- 5	1 1/2	- 1/8	-11.1
N	STORAGE TECHNOLOGY	14- 46	17 1/8	+2 1/8	+14.1
O	T BAR INC	11- 25	24	+2 1/4	+10.3
A	TEC INC	6- 13	5 7/8	- 1/8	-2.0
N	TEKTRONIX INC	33- 63	60 3/8	+1 3/8	+2.3
N	TELEX	3- 9	3 1/2	+ 1/8	+3.7
C	TESDATA SYSTEMS CP	8- 26	7 1/2	- 1/4	-3.2
C	WILTEK INC	1- 2	3/8	- 1/8	-25.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1978-79 RANGE (1)	CLOSE NOV 28 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 12	11	+ 3/4	+7.3
O	BALTIMORE BUS FORMS	1- 4	1	0	0.0
N	BARRY WRIGHT	14- 34	21 3/4	+2 1/8	+10.8
O	CYBERMATICS INC	1- 1	3/4	- 1/8	-14.2
O	DUPLEX PRODUCTS INC	13- 31	26 3/4	+3 5/8	+15.6
N	ENNIS BUS. FORMS	5- 21	16	+ 1/2	+3.2
N	3M COMPANY	43- 66	50 1/4	+1	+2.0
C	MOORE CORP LTD	26- 34	28 3/4	+1	+3.6
N	NASHUA CORP	18- 37	30 5/8	+3 3/8	+12.3
C	STANDARD REGISTER	20- 29	25 1/2	- 1/4	-0.9
A	TAB PRODUCTS CO	8- 19	14 3/4	+ 7/8	+6.3
A	WABASH MAGNETICS	10- 22	13	+ 3/8	+2.9
N	WALLACE BUS FORMS	18- 33	27 1/8	+ 3/8	+1.4

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
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